

Rock Products

Volume XXVI

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Number 2

Unusual Difficulties No Obstacle

Producing in the Heart of a City Where Noise, Vibration, Concussion, and Dust Are Public Nuisances, and on a Small Tract Where Trucking Difficulties Enter, E. H. Bradbury's Plant Has Met Every Obstacle and Is Producing Successfully Today

DIFFICULTIES to be met and overcome are the spice of life for the quarry operator, but there are few quarries where so many special conditions and difficulties on every hand have been successfully met as at that of E. H. Bradbury. The quarry is located in the heart of Kansas City, Mo., and the dangers of blasting, the nuisance of excessive dust from crushing, the trucking difficulties due to the restriction of space and contour of ground, and the problem of working the quarry with the edge of a brick business block on one property line, have all been overcome.

It is necessary to consider these unusual conditions and the need for designing a plant to meet them. A design which might have been faulty under other circumstances has proved to fit the existing conditions well.

The plant had to be suitably placed on a tract 310 ft. by 150 ft. in area, on which

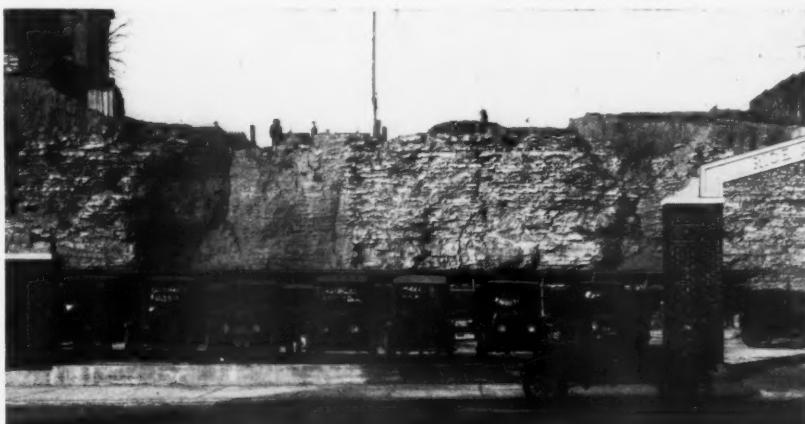
The illustration at the right shows part of the original property—after stripping some of the overburden. Below is the same tract after the erection of the plant and the taking down of several feet of ledge

was a deposit of about 30 ft. of limestone rock, covered with about 15 ft. of clay. At first, and for the greater part of the life of the plant, the only exit for trucks hauling crushed rock would be at the northwest corner of the tract and on a level with the top of the rock ledge. This limited the depth at which loading bins could be placed, as it was necessary to

have a reasonable grade for trucks from the bins to the street.

The plant is in the heart of the city, adjacent to dwellings and business houses, and it was necessary to have a compact, housed-in plant, to prevent dust and noise from being a nuisance.

In order to meet demands for various sizes of crushed rock it was thought de-

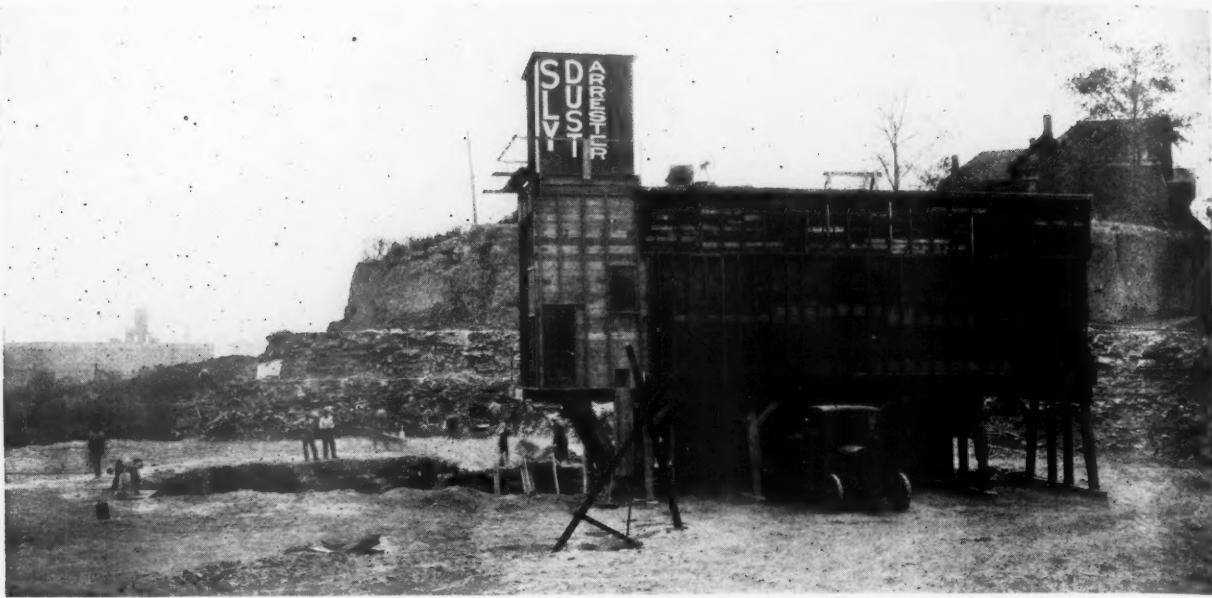


sirable not only to screen the various sizes, but to be prepared to combine them afterwards.

With these preliminary remarks we can follow the design and operation.

A Gardner compressor driven by a 20-hp. motor provides about 90-lb. pressure of air for a Sullivan jack-hammer drill, D. P. 33.

The rock is taken down in about 8-ft. levels, using 40 per cent dynamite in holes 5 to 6 ft. back from the face and 7 or 8 ft. apart. With this method it is not found necessary to "dope" any rock and it is rarely needful to drill large stones and break with plug and feather. No damage to plant or adjacent buildings has occurred, and the north line has been accurately cut with pow-



To get the crusher low enough to take stone without elevating it during most of the life of the plant the hole shown here was sunk in the ledge. In this depression was erected the crushing and screening plant behind the loading bins shown, which had to be high enough to give trucks exit at a reasonable grade at the top level of the original property.

der, with a two-story brick building within a few inches of the line, as shown in the photograph.

The only crusher is a Williams No. 3 Jumbo, with a capacity of 50 tons per hour, driven by a 40-hp. slip-ring motor direct connected. At this rate, about 23 per cent is smaller than 3/16 in. and about 13 per cent refuses to pass 1 1/4-in. round holes. It is believed that changes can be made in the crusher that will reduce both the fines and the rejects, if desired.

The crushed rock is elevated about 30 feet vertically on a chain elevator with continuous buckets, and delivered into a 36-in. by 16 1/2-ft. revolving screen. Traction wheels 14 1/2 in. in diameter are mounted on the head shaft which turns 41 r.p.m. and is driven through a worm gear by a 7 1/2-hp. motor running 1750 r.p.m. The worm gear was formerly part of an Otis winch. The screen turns 20 r.p.m. and is driven by chain and bevel gearing from the head shaft. To the

same head shaft is connected a dust elevator which lifts the screenings (fines below 3/16 in.) from the bottom of the receiving bin to a height sufficient to discharge into the loading bin. A small perforated revolving screen was installed at one time to separate the screenings into chicken grits and agricultural limestone, but it clogged up and had to be abandoned, except at times when the crusher



Trimming the stone under the foundation of a building without giving cause for damages calls for expert quarrying. Above are shown one bench trimmed to the property line at the edge of the building, and a second bench approaching the line. The illustration at the right shows better how carefully work has been done.



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runs at about 50 per cent of its capacity.

A Rotex screen will be installed shortly to make a separation of the 3/16-in. screenings into three parts, by a 12-mesh and 8-mesh screen.

It was found necessary to place a sheet iron trough under the 3/16-in. section of the main revolving screen, on a slope of about 45 deg., narrowed at the bottom to deliver into the buckets on the dust elevator.

The next division on the main screen has 3/4-in. round perforations, followed by a section with 13/16-in. perforations, the rejects being discharged at the end. It was expected to return the rejects direct

the motor and gear at the top, and works perfectly. While bottom drive elevators are not considered best practice, in this case there are many advantages for it and the result is perfectly satisfactory.

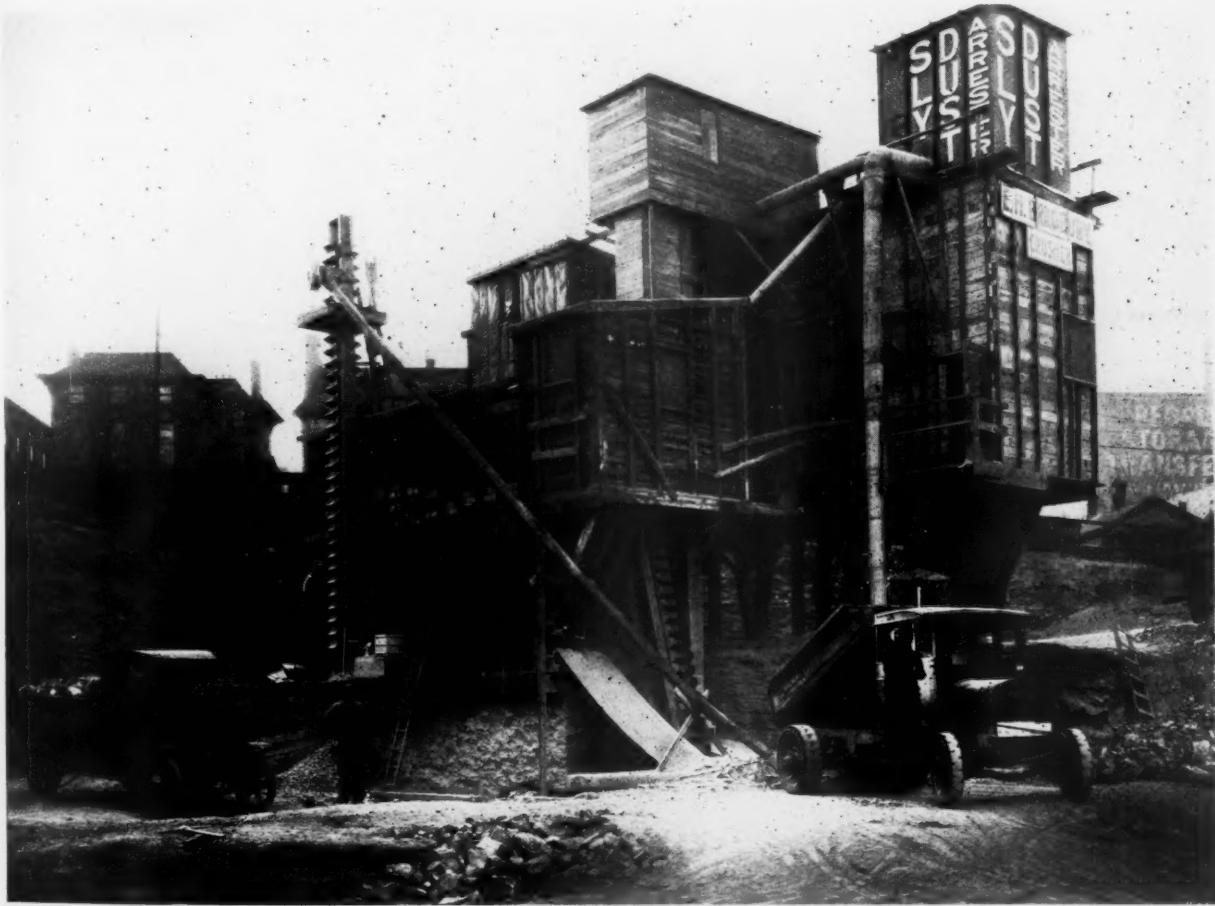
Shorter Elevator to Reduce Dust

The three grades, called grits, binder, and rejects, drop into the receiving bin, and by bottom doors can be discharged on a chute either separately or mixed as desired, and so delivered into the buckets on a belt elevator placed almost vertically between the receiving bin and loading bin and elevated to a sufficient height to permit the separate, or mixed products, to

bins desired. This is indicated in the plan view and shown in detail in the Hints and Helps department of this issue.

The elevator and conveyor are driven by a 5-hp. 1750-r.p.m. motor through a worm gear reduction unit, ratio 49 to 1. This type of gear has not been found wholly satisfactory at this installation. It is especially troublesome at low temperatures and it is found necessary to drain the oil at night and heat it before putting back in the morning, although the motor is quite large for the work. A spur gear at the plant has been found much more satisfactory.

In order to avoid draining oil in cold



This "heart of the city" plant gives a neat, compact appearance. The truck here is dumping to the crusher which delivers to the main elevator. The screen house and initial bins are at the left; the loading bins and dust arrester at the right. At the left is the bottom-driven "rejects" elevator, with the return pipe to the crusher for oversize

from the end of the screen to the crusher but the slope was not great enough and there was a considerable demand for the rejects and so another elevator was installed to make it possible to return rejects to the crusher or store them in bins for sale as desired. The reject elevator is shown in the photograph. It is driven with a 3-hp. motor directly connected with a James spur gear reduction. It is driven from the bottom, to save mounting

be placed in either of three bins, by means of a conveyor. Had it not been for the dust nuisance the belt elevator between the bins would have been made tall enough to spout into each of the three bins and no conveyor would have been needed. As it is, the elevator discharges into a hopper over an 18-in. belt conveyor 9-ft. centers which can be revolved on its 9-ft. radius in a channel iron track so as to discharge into any one of three

weather from the worm gears, an electric heating device has recently been designed and installed. Boxes of No. 18 gauge sheet-iron, lined inside and out with asbestos, were made to fit over each of the two worm gear reductions. These boxes are open at the bottom and are removed in the daytime. A 500-watt, 220-volt heating unit is mounted near the bottom on the inside wall of each box. Each box is controlled by a separate switch on the

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main switchboard, connections being made by flexible armored cable. Asbestos covered wire is used inside the boxes, although the heating units used are of a type that does not get to a red heat. These heaters are satisfactory and keep the oil warm all night.

From the loading bin the crushed rock is drawn off into trucks by suitable gates and specially designed swinging spouts shown in detail by plans and photographs on the Hints and Helps pages of this issue. A 4-yd. truck can be loaded in less than a minute by one man.

When the plant was ready for operation in August, 1922, it was found that the

crushing and screening made working the quarry impossible until the problem was overcome.

It seemed difficult to get accurate information and various plans were tried and

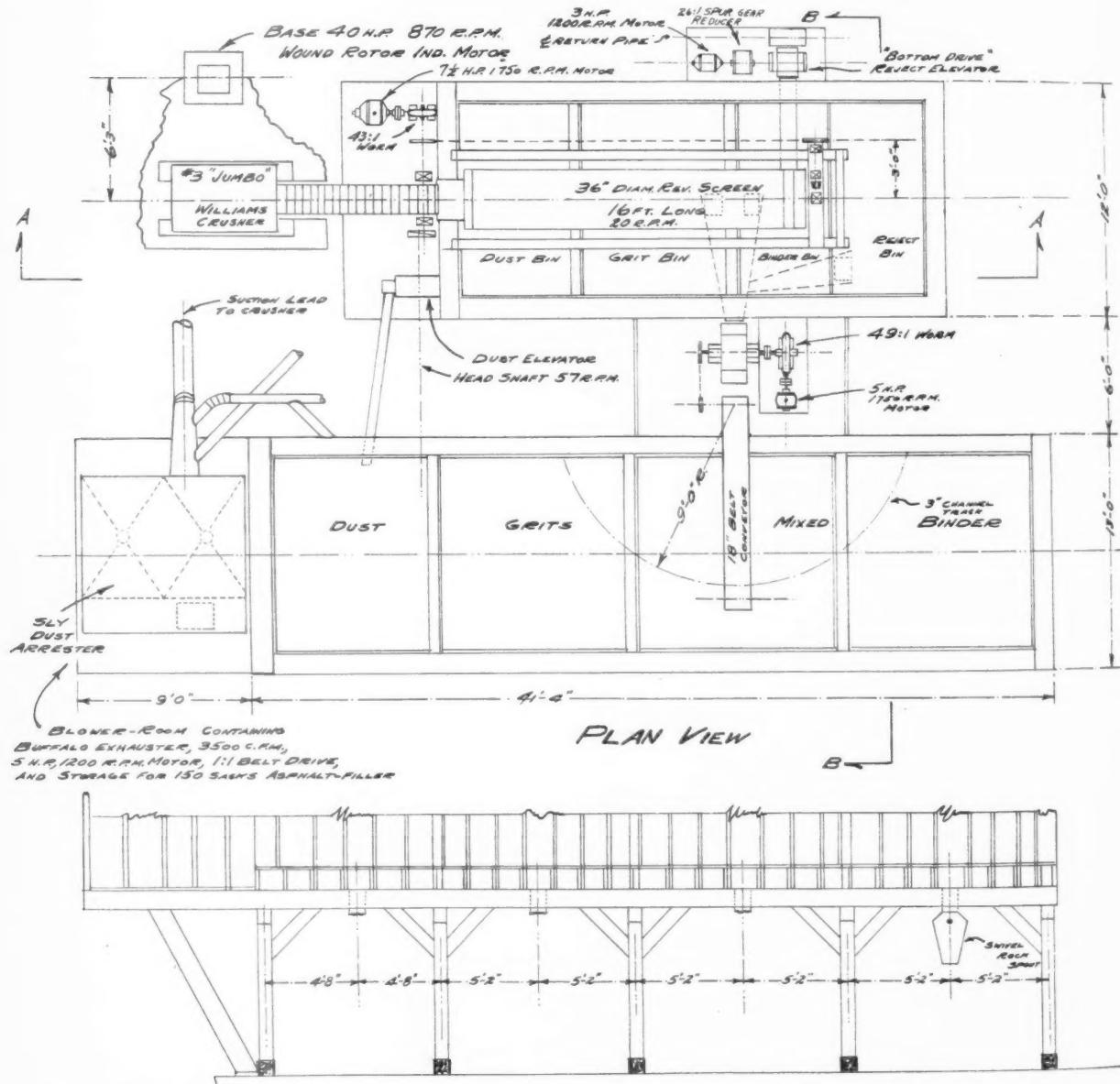
abandoned, until finally a Sly dust arrester was installed with a No. 8 Buffalo exhauster on the fresh-air side driven by belt from a 5-hp. motor. From the other side of the arrester, pipes of suitable size were led to the crusher and screen room and loading bins.

In operation of the plant, about 3,000 cu. ft. of air per minute is drawn from the points where the dust originates carrying the fine dust to the arrester, which is an air-tight steel house about 8 ft. square and 10 ft. high, containing some 2,000 sq. ft. of cloth screen ingeniously arranged for "rapping" which is done twice a day. The screen stops the dust

The full Transactions

of the

**National Crushed Stone Association
will be published in the
March 10 issue of
ROCK PRODUCTS**



This plant's location in the business section of a city of 350,000 calls for features of design out of place elsewhere. It is closed in to minimize dust and noise. The dust arrester, originally installed to prevent the dust nuisance, produces a quantity of fine product which sells at a good price. A big advantage of this location is elimination of freight charges and the reduction of trucking costs.

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What Goes Into a Mile of Concrete Road

and fresh air is discharged from the fan. The dust collected is very fine, 90 per cent passing a 200-mesh screen, and it is salable for asphalt filler and other purposes.

From two to three tons of this dust are collected every day and packed into 80-lb. bags by a Bates Valve bag packer and sold at \$5.00 a ton. The crushing plant produces from 250 to 300 tons of the three

It is a simple matter for any contractor to figure out the amounts of cement, sand and gravel needed for a certain length of highway construction. In fact, Bulletin 1077 of the United States Department of Agriculture contains a vast amount of this sort of information, with tables giving approximate figures for va-

ment, 7 in. thick at the edges and 8 in. thick at the center, will require 3913 bbl. of portland cement of 2249 cu. yd. of concrete, including 1102 cu. yd. of sand, or fine aggregate and 1664 cu. yd. of coarse aggregate or stone.

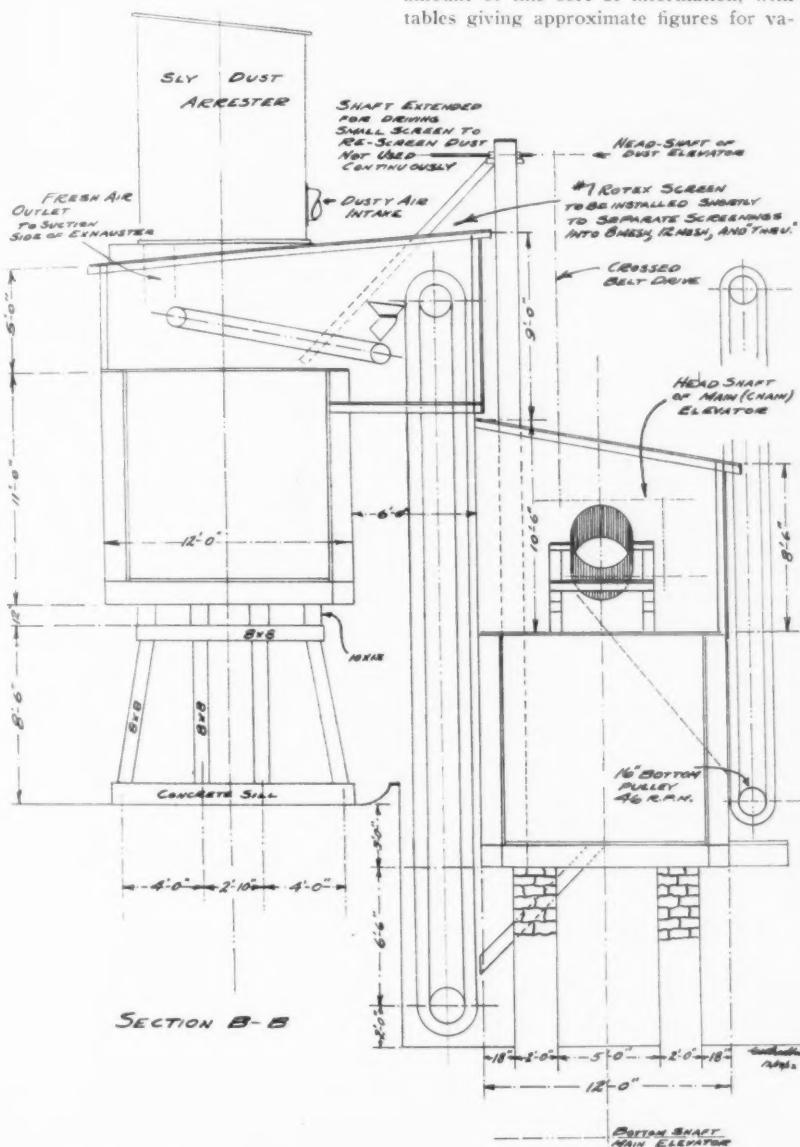
In making 3913 bbl. of portland cement, over 390 tons of coal are burned at the cement mill. Approximately 19 tons of gypsum are required to regulate the setting time of the material. To get the cement shipped to the construction job, over 15,600 cloth cement sacks are needed—and approximately 15 bales of cotton must be woven into cloth to supply this item. Incidentally, over 30,000,000 cloth cement sacks are lost or destroyed each year, and the textile mills are called on to furnish material for the replacements. Back in the cement quarries, approximately 450 lb. of dynamite were shot off in blasting loose the raw materials required for the cement for the mile of highway.

The government bulletin estimates that 30 gal. of water are needed to mix and cure a square yard of concrete pavement. Over 300,000 gal. of water must be furnished for the mile of road, and approximately 4500 tons of concrete go into the construction.

A good idea of what the highway construction business means to the railroads can be obtained from the requirements of the mile of concrete road. About 42 cars of fine aggregate, or sand, are needed on this job. Sixty-five cars of coarse aggregate are required, and it takes 20 cars to haul the cement—or 127 cars for the basic materials. Where re-inforcing is specified, further transportation is called for, while the water supply is governed by local conditions. In addition to these requirements, the drainage, grading, bridge and culvert construction must all be provided for.

When it is considered that the equivalent of over 7000 miles of 18-ft. concrete pavements were placed under contract during this year, the enormousness of the transportation end of the work is easily seen. More than 880,000 freight cars are needed to transport the cement, sand and gravel for this operation. As the peak of the demand comes during the late summer and fall, there is added difficulty in getting materials on the job at exactly the time desired. Early shipments of construction materials, and loading of all cars to capacity limit would go a long ways toward alleviating the congested conditions.

—*Western Contractor.*



An end elevation of the plant shows the screen house and initial bins at the right. Sized material, or any desired mixtures, can be elevated and distributed to the loading bins at the left.

grades of crushed stone in each 8-hr. day.

The plant was designed by E. H. and E. S. Bradbury, the owners, assisted by George E. Bogard, superintendent, and H. W. Morrison, mechanician. G. V. Bradbury, son of E. H. Bradbury, assisted in the design and erection of some additions.

various thicknesses of pavement. Information on the preliminary work is not so easily obtainable, however, and there are some amazing sidelights to the construction industry that the contractor has but little opportunity to come in touch with.

For example, the government bulletin estimates that a mile of concrete pave-

New Silica Sand Plant

THE BALLOU WHITE SAND CO., Millington, Ill., has recently completed the erection of a new building, complete with air separating and screening equipment for the production of graded silica of any size from 200 to 20 mesh.

Cement Industry Is Optimistic for 1923*

By John R. Morron

President of the Atlas Portland Cement Co.

WITH confident faith in the integrity, ability and constructive genius of the American people to meet the economic and political problems urgently pressing for solution and after careful analysis of reliable trade indices, I cannot look forward to 1923 with other than optimism for those engaged in the manufacture and sale of cement. This year has been one of gratifying expansion in demand, but a year of many harassments and unusual obstacles.

The fourth largest consumer of coal in the United States and the largest user of pulverized coal, the industry which used

is an increase of 20 per cent over 1920, which was the former highest year's tonnage. This expansion is a growth that has been steady and (except for the war period) continuous for the last 20 years, as Chart I shows. The beginning of the almost perpendicular rise which commenced about 1900 was simultaneous with the general adoption of the rotary kiln, which made for perfection of quality and economy of manufacture.

The last year's demand is not difficult of discernment. When those directing our energies in the war decided that construc-

forms of construction may change but, as home building slackens, industrial and commercial construction will increase.

The accompanying table gives for 1919 to 1922 the average monthly amount of contracts awarded for construction. After the great building boom of 1919 there was a considerable falling off in 1920, which was not reflected in cement shipments until 1921. That year was still slightly lower in square feet of building construction. The amount of contracts awarded for construction for the first 11 months of 1922 was 45 per cent greater than the first 11 months of 1921 and 33 per cent greater than the whole year of 1921. It would seem reasonable to presume that this extraordinary movement is not temporary but a reflection of an underbuilt condition of such extent that construction must proceed at this rate for some time to come in order to bring the nation to a point approaching normal.

It is not alone from structural building that the demand for cement will continue but also from those other fields of enterprise in which cement forms an integral part. Years ago kerosene was hailed as a beneficent by-product of crude oil. Today the thousands of extracts of crude oil, especially gasoline, have made the basic product a world necessity. So it has been with cement. The very foundation of the world's constructive development rests upon the permanence, safety and economy of that material.

Just stop for a moment to think how varied are its uses—home, office, farm, railroads, canals, highways, sidewalks, viaducts, dams for irrigation and power, bridges, tunnels, subways, army and navy defense, sewers, pavements, tiles and pipes, besides the thousand of smaller utilities and the artistic decorative beauty obtainable. It is from this ever-expanding field of usefulness that the great demand will arise and, unless all signs fail, the year 1923 will outstrip its predecessors in shipments. Yet the industry has more than kept ahead of all demands upon it and will continue to do so. The present production capacity of all cement mills is between 140,000,000 and 150,000,000 bbl. annually, thus leaving a large margin between consumption and capacity.

Everywhere is evidence of national, municipal and industrial reconstruction and ex-

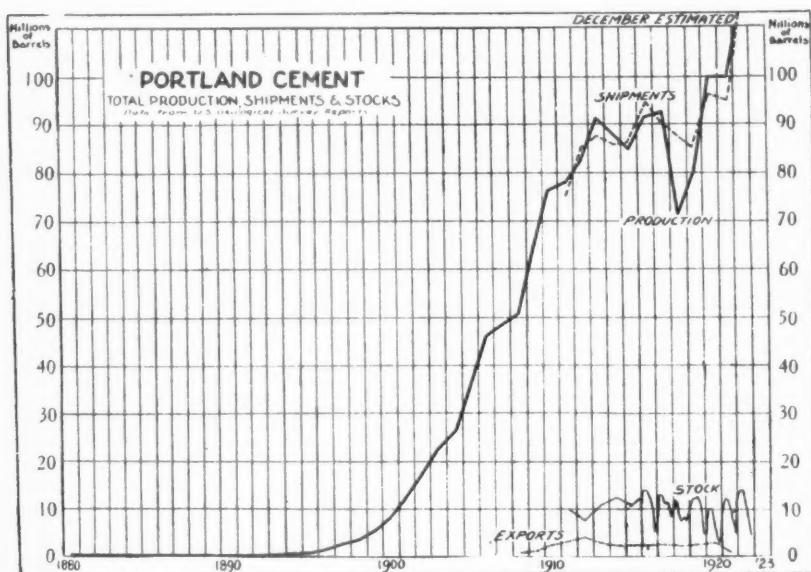


Chart I

7,400,000 tons in 1921 is very dependent upon coal supply for production and the cost of manufacture. An increase of \$1 per ton for coal increases the cost of manufacture 10 cents per barrel. For a time last summer the cement mills were paying more per ton for coal than they received for their product. Despite the difficulties of coal supply and the railroad car shortage and embargoes which seriously hindered shipments the industry has closed its banner year in volume with total shipments of more than 115,000,000 bbl. This

tion and reconstruction were non-essentials, there began a damming-up process of delayed structural requirements that burst into activity, so soon as restraint was removed. The housing problem became acute to the point of suffering until private homes and home sheltering structures were built in feverish haste. There are those who contend that this crisis has been met and that the peak of home building has been passed. Rental and building permits do not confirm this, and, until the high rentals are materially reduced, capital will continue to flow into home and apartment building. The ratio between residential and other

*Reprinted from the *Annalist*.

tension in which cement will be necessary. Only recently announcement was made of the proposed construction of a dam to harness the power of the river above Quebec and to furnish 1,200,000-hp. for light and power. School structures are still inadequate to meet the demands for the rudimentary education of our growing population. Cement highways have proved their merit and highway officials are planning increased mileage of that construction.

The mileage of cement roads constructed annually has increased from 2,365 miles in

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have been inconvenienced heretofore by the seasonal character of cement construction. As the storage of cement on account of its nature requires extremely well-built and expensive storage houses, distributors have provided themselves with only limited storage facilities. This results in a heavy concentration of cement shipments in the summer months when outdoor work is more easily carried on. With the adverse traffic conditions that the country has suffered from in the last two years it has been extremely difficult and at times impossible

silk dress goods. The incineration of the raw material takes place at a temperature of about 3,000 deg. F., in a slowly revolving fire-brick-lined kiln from 150 to 240 ft. long. Throughout continuous tests to insure uniformity of product and dependability are made.

Much of the result achieved in developing the cement industry and conducting scientific education and inspection has been due to the Portland Cement Association. Through this organization most of the cement companies co-operate for the conduct of research and experiments, maintaining laboratories to investigate new uses and to determine the best methods for cement and concrete construction.

The findings are in each instance made public. For the purpose of spreading the results of this research and to educate the consumer the association maintains 24 offices throughout the country, employing 200 experienced engineers. The work includes direct inspection of construction in order to make sure that the concrete roads and street pavements for which the public's money is spent are properly constructed in accordance with the specifications and the best concrete practice. The outstanding example of this co-operative educational work is the rapid growth of the appreciation in the public's mind of the merits of the concrete road. In 1914 5,000,000 bbl. of cement were used in this type of construction, in 1921 22,000,000 bbl. and in 1922 the total will be more than 25,000,000 bbl.

The great value of the educational work of the Portland Cement Association was felt particularly during the two or three years immediately following the war, when most of our country's industries suffered loss and disastrous depression, while the production and shipments of cement continued in rather satisfactory volume.

So much mistatement has been forced upon public attention that it is but fair to point out some of the more glaring ones. When one reads or is informed that cement is selling for \$2.50 per barrel, it should not be accepted as the income received by the manufacturer. From the trade quotation must be deducted freight rate, bags and discount. With freight of, say, 38 cents, four bags returnable at 10 cents each, and a discount of 10 cents, the manufacturer's price is reduced to \$1.62 per barrel, or \$8.10 per ton. The bags are returnable to the manufacturer at the price included in the quotation, at the present time 10 cents each, at which price they disappear from the trade through wear and tear and must be replaced at a price of 10 cents per bag. These bag losses amount in the aggregate to very large sums of money (more than \$3,000,000 in 1921 for nineteen Eastern companies).

According to the reports of the United States Geological Survey the average prices received by the cement mills in the Lehigh valley were:

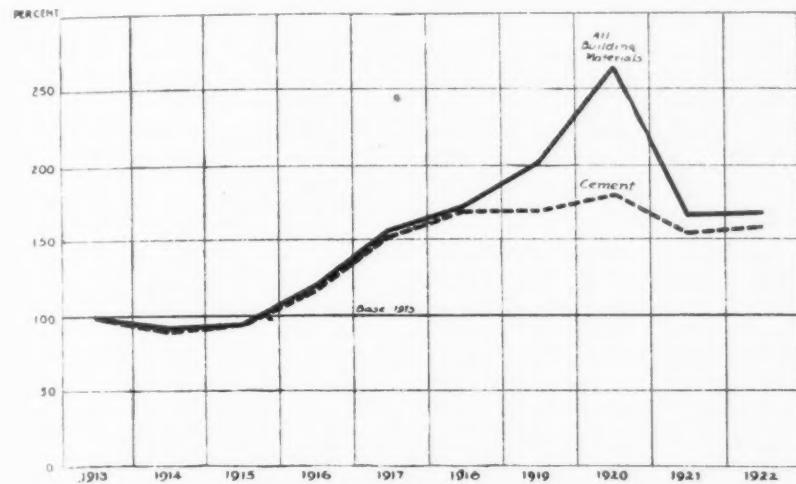


Chart II—Price Index of portland cement compared with that of all building materials—Data for U. S. government reports

1919 to about 7,000 miles in 1922. At the end of this year there will be an uncompleted yardage under contract of about 35,000,000 sq. yd., equal to about 3500 miles of an 18-ft. roadway—more than all the concrete roads in the United States in 1917. The rail transportation problem has become one of national welfare. The need of construction and maintenance of extensions as well as lack of necessary terminal facilities, has reached a point where much work must soon be done. A transportation breakdown is unthinkable. New York and other cities must have new subways. State and municipal works for the protection of the health and welfare of the public, and to provide it with those conveniences which modern civilization demand, are pressing for construction. Huge enterprises for water power and irrigation await the proper opportunity and there is before Congress the suggestion of appropriations for Federal office buildings throughout the land. Institutional buildings, hospitals, social, religious and recreational projects are contemplated.

Modern forms of building are required to replace decayed and old-fashioned, unsafe structures. On every hand the signs of the time point toward cement with ever increasing demand and indicate that the "Era of Cement" has arrived.

Both the manufacturer and the public

to move the necessary tonnage to meet this summer demand.

The remedy for this congestion is a wider spread of the construction period, with earlier spring and later fall and winter work and a more even distribution of purchases by dealers. The educational work of the Portland Cement Association in connection with safe methods of carrying on winter construction in cement will result very advantageously to the public, in that the summer peak of shipments may be kept from rising higher, thus avoiding higher prices and inability to meet the summer demand because of the limitations of transportation.

The public, through lack of understanding of the difficult and costly process of manufacture, has assumed that cement is only pulverized rock. The process from the time that the raw material is blasted out of the solid ledge rock to the time that it is delivered to the consumer, an accurately proportioned and dependable article, is a complicated and expensive one. It involves eight fine grindings of cement rock, limestone, coal and the incinerated combination.

Two of these grindings, one of the raw materials and the other of the incinerated combination of them, is to such a fineness that the resulting powder may be passed through a screen of greater fineness than

\$1.64 per barrel in 1919, or \$8.20 per ton.
\$1.51 per barrel in 1920, or \$9.55 per ton.
\$1.78 per barrel in 1921, or \$8.90 per ton.

Thus, it is seen, that the highest average price was but \$9.55 per ton during the peak prices of 1920, and that price represents the highest average price received by the Lehigh valley mills for the last decade. Chart II shows the index price of cement from 1913 to date, compared with the index price of other building materials for the same period, all of the data being taken from government reports. The comparison acquits the cement industry of the charge of profiteering, and shows how little the price of cement followed the peak prices of other building materials.

A few individuals may have speculated in cement, but this speculation cannot assume any great proportions on account of the small storage capacity available to distributors and the policies pursued by most of the companies in this respect. It has been misstated that the cement companies limit the amount a purchaser may buy. A buyer may purchase all of the cement that he wishes at the current price, provided he will accept delivery at once or within a very short period.

In general, cement companies will not make a contract for the future delivery of cement at the price then prevailing. A notable exception to this policy is made in order to stabilize building cost; in that, a prospective builder or contractor may know when he starts a project what his cement will cost him throughout the life of that project; that is, a contract may be made at the present current price for future delivery for use on a specific piece of work. This is done with the expectation and in accordance with the terms of the contract that the cement so contracted for shall be used only in that work, so that none of it may get into speculative hands to the detriment of the public.

Unfortunately, abuses have entered into these contracts for specific work. Frequently purchasers, either through lack of information of the exact requirements of the prospective work or through an anxiety to be amply and safely covered on deliveries, sometimes make these contracts for an amount in excess of the requirements of the work and even duplicate such contracts with more than one cement company. This introduces an element of uncertainty for the cement companies in that, with the multiplication of a great number of such cases a company will sometimes consider that its product or a large proportion of it, has been sold, when, in fact, a large proportion of the amount of cement on contract for specific work will not be called for. If however, there has been an increase in the cost of manufacture, with a resulting increase in price, purchasers holding these overestimated or duplicated contracts at the former low price will, in many instances, order out the cement for other uses than

the work specified and in violation of the terms of the contract.

This means of speculation is guarded against as carefully as possible by the individual companies, but efforts are materially handicapped by the inability of the cement

construction of such homes. A variation in the price of cement of 25 cents per barrel in the case of such a house is equivalent to only a day's pay to a plasterer or bricklayer. Is it imaginable that construction of any home would be abandoned on account of a consideration so little affecting its total cost?

Chart III is full answer to the charge of undeserved profits. The most accurate basis from which earnings could be calculated is the reported income tax returns, and the reports to the government of 19 cement companies operating in the Northeastern states from 1912 to 1921 inclusive have been used for the lines shown. For the best year, 1919, the earnings were 6.7 per cent before dividends on stock were paid. In 1920, a year in which profiteering was at its height, these 19 cement companies earned 4 per cent on invested capital, and certainly that shows no reflection on profiteering.

When one considers the enormous amount of capital required in this industry (\$2.50 for each barrel of annual output) the expensive operation through which the quarried rock must pass before it can be sold as a standard quality to the consumer, the high labor and coal costs, the exacting specifications, and the high quality expected—the wonder is that cement is the cheapest of

Building Contracts Awarded

(as reported by the F. W. Dodge Co.)
27 Northeastern States.

Average monthly awards in thousands
of sq. ft. (000 omitted.)

Construction.	1919.	1920.	1921.	1922.
Business	9,240	6,870	5,437	8,138
Industrial	12,772	10,652	2,981	5,577
Residential	20,157	11,460	17,047	25,949
Educational	1,915	2,190	3,382	4,751
Hospitals, institutions	368	523	890	1,032
Public buildings	172	236	252	290
*Public works	654	334	704	906
Social and recreational	1,265	1,030	1,456	1,626
Religious and memorial	444	422	767	1,134
Grand total	46,683	33,491	32,267	44,940

*Given in number of projects.

^aGrand total includes military and naval buildings and miscellaneous in addition to the groups listed.

companies under government restrictions to co-operate by means of a comparison of cement contracts filed with the several com-

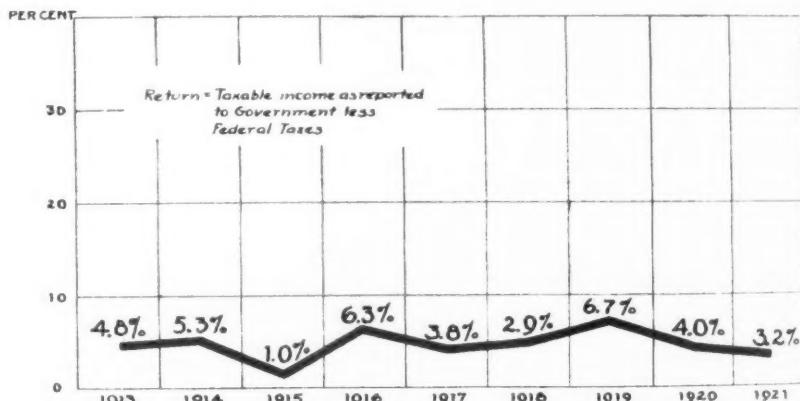


Chart III—Percentage of return on invested capital, as reported to the government by 19 Eastern cement companies

panies for the purpose of detecting duplicates.

In the construction of a modern home costing from \$8,000 to \$10,000, the amount of cement necessary, including the building of sidewalks, costs from 1½ to 2 per cent of the total. In figures this amounts to from \$120 to \$200 for the cement used in the

all manufactured products.

I believe in the cement industry. I believe in its future, and I believe in its honest administration and its efficient management for the welfare of the nation and the individual. Its growth has not come from the rubbing of an Aladdin's lamp, but has resulted from energy, foresight and scientific research. It renders service to increase public security, health and prosperity. It might be well termed a "public service institution."

I believe the industry realizes and accepts its responsibility to provide cement of the highest quality at the lowest price as a duty toward national advancement, and that the industry has been and will be conducted for the best interest of all.

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Big Possibilities for the Use of Dolomitic Limestone*

By J. B. Shaw and G. A. Bole

Part II—The Caustic Calcination of Dolomite and Its Use in Sorrel Cements*

ABSTRACT

A method of calcining dolomite in which the pressure of carbon dioxide is controlled is described. Less than one-half of 1 per cent of lime is liberated. Material was calcined in ton lots using external heating. Two types of retort were used: wrought iron and fire clay. Floors were laid from the material so calcined and physical tests made on the calcine to determine its availability as a stucco material.

DURING the past few years the demand for a properly calcined caustic magnesia for use in the building industries has increased many fold. The oxide is used in two general ways: First, mixed with from 20 to 40 per cent of filler (asbestos, wood fiber, ground cork, etc.) and appropriate coloring oxides it is made into a composition flooring; second, mixed with 50 to 60 per cent sand and 20 to 30 per cent silex it makes an excellent stucco material. The general practice is to mix these compositions with sufficient 20 to 22 deg. Beaume $MgCl_2$ to spread properly when an excellent cement results.

A rather pure magnesite is necessary to produce a satisfactory material using the present burning practice due to the fact that all carbonates present are decomposed. Free lime even in amounts under 2 per cent is detrimental to the life of an oxychloride cement and in quantities over 3 per cent causes early disintegration. With this thought in mind and in view of the fact that high magnesia ore is not found near the centers of consumption, investigations were undertaken by the authors¹ to determine whether or not ore low in magnesia and high in lime, such as the dolomites, could not be used for the purpose. It is evident then that ores high in calcium carbonate must not be burned in such manner as to liberate free lime.

Effect of Time, Temperature and Pressure

Since the pressure of carbon dioxide in equilibrium with calcium oxide and calcium

PART I of this vastly important subject to the quarry industry appeared in *Rock Products* for December 16. This article will show that from dolomite, by partial calcination, a cement of remarkable properties may be produced.—Editor.

carbonate at temperatures as low as 650 deg. C. as shown by Johnston² is appreciable, it is evident that it is impossible to burn a dolomite at this temperature in any of the kilns in use at the present time for burning magnesites, without liberating lime. The present general practice with magnesites is to burn in an updraft kiln, only a small amount of the present production coming from rotary kilns.

Aside from the foregoing considerations there are two objections to burning the ore at a temperature as low as 650 deg. C. First is the consideration that cements made from ores burned below 700 deg. C. are not as satisfactory as those made from an oxide burned between 700 and 800 deg. C. This is not a generally recognized fact and the explanation is not clear. The cause should be investigated. An oxide calcined at 725 deg. C. or thereabouts seems to have different physical characteristics from that burned at either a higher or lower temperature. Illustrative of this fact, the following table shows the effect of temperature of calcination on a magnesite low in lime used in a stucco mix. The same relation was later found to hold when using dolomite mixes. (See Table V.)

*Part I of this article was published in the Journal of the American Ceramic Society, Volume 5, No. 6, in June, 1922, under the title, "New Developments in Oxychloride Stucco and Flooring." Part II is reprinted from the November issue of the Journal.

¹Shaw and Bole, Journal American Ceramic Society, 5, 311 (1922). ²Johnston, Journal American Chemical Society, 32, 938-46 (1910).

The effect of time, temperature, and pressure of carbon dioxide upon three types of dolomite is brought out.

Dolomites are either double salts or solid solutions or mixtures of the two.

The effect of lime and silica is pointed out.

Dissociation, tensile strength, volume change, time of set, and weather test data are given.

The cement, the physical characteristics of which are given in Table I, was of a (1 MgO-2 silex-5 sand) stucco mix, made up with 22 deg. Beaume $MgCl_2$ solution.

The time of set was in all cases determined by the Gilmore needle.

The weathering tests consisted of allowing the tensile strength briquettes to age 14 days and taking an average of the breaking strength of three briquettes as the dry strength. Six briquettes were then soaked in water three alternate days (24-hr. periods), and three of the six broken wet. The others were allowed to dry out for two days in normal air and then broken. This average divided by the average dry strength at 14 days was taken as the recovered strength indicated in Table I.

The second disadvantage referred to is the time element in burning. Some dolomites will calcine very much more quickly at temperatures below 750 deg. C. than will others. A study was made of this feature of the burning problem with the results indicated in Fig. 1. A sample of 0.5 gram under one atmosphere of carbon dioxide was heated in a small quartz side delivery tube in an electric furnace at the rate of 1 deg. per minute until a temperature of 950 deg. C. was reached. The evolved carbon dioxide was collected over mercury in a graduated cylinder and the volume of gas evolved at each temperature observed.

A distinct lag appears in a time-temperature curve at 750 deg. C. due to the endothermic reaction $MgCO_3 \rightarrow MgO + CO_2$ — X calories in the case of dolomite No. 3, but No. 1 shows no distinct break. Bleiminger and Emley³ found this same break, but do not point out that it holds for only one type of dolomite.

Dolomite No. 1 was of the dense variety, No. 2 finely crystalline and No. 3 was a

	TABLE I 650 deg. C. 4½ hr.	700 deg. C. 3 hr.	750 deg. C. 3¼ hr.	850 deg. C. 5 hr.
Time of set				
Tensile strength (24 hours).....	350	480	500	450
Weathering (per cent of original strength recovered).....	63	80	80	72

highly crystalline stone. When later tried out in a semi-commercial way it was found that No. 1 could be calcined advantageously at 650 deg. C., while No. 3 dissociated so slowly below 750 deg. C., that it was not a commercial proposition to calcine below that temperature. It so happened that No. 3 was the most desirable one of the three on account of its pure white color and the ease with which it could be milled. The chemical analysis of the afore-mentioned ores indicated the following compositions:

	TABLE II		
	No. 1	No. 2	No. 3
MgCO ₃	39.40	46.20	43.32
CaCO ₃	59.10	53.60	55.21
SiO ₂35	.25	1.00
R ₂ O ₃82	.65	.46

In light of this data certain dolomites, it would seem, can be considered to be solid solutions from which MgCO₃ separates and dissociates progressively as the temperature is raised—CO₂ pressure being held constant—while others would seem to be a double salt with a decomposition temperature of 750 deg. C., while still others are a mixture of the two.

The above considerations are only tentative, but seem to explain this peculiar behavior of the dolomites better than any suggestion yet offered. The whole question is to be attacked microscopically with phase-rule interpretation.

The Effect of Silica

It was further found that not all dolomites would make up to a satisfactory cement even when burned under the most favorable conditions of temperature—time—pressure. The unsatisfactory stones were found to be all high in silica. The analysis of a stone burning to a particularly unsatisfactory oxide was as follows:

CaO	MgO	SiO ₂	R ₂ O ₃	L.O.I.
29.15	20.00	6.10	.55	44.50

This stone was classified by the quarrymen as a water lime. Whether there is a calcium silicate formed at such a low temperature (under 850 deg. C.) seems to be problematical, but worthy of investigation. We have not been able to make a satisfactory cement from any ore containing more than 4 per cent SiO₂.

The Method of Burning

The calcination of the ores was carried out in two different types of retorts; the chamber containing the ore in the one case being of wrought iron and in the other of a fire clay body. The gas-tight chamber containing the ore was so constructed as to give perfect control of the atmosphere within. A tube leading from the retort beneath a water

seal kept the pressure of the carbon dioxide inside the retort at one atmosphere. The seal indicated when the calcination was completed by a slowing down and final cessation of evolved gas. The retort was heated externally by natural gas in a suitably constructed furnace. The temperature of the furnace was carefully regulated with 25 deg. of any desired temperature. The two calcining chambers had a capacity of ½ and 1½ tons respectively. The time necessary for the calcination in both cases was from 10 to 12 hours.

In all, about 15 tons of material was calcined at a temperature varying from 700 to

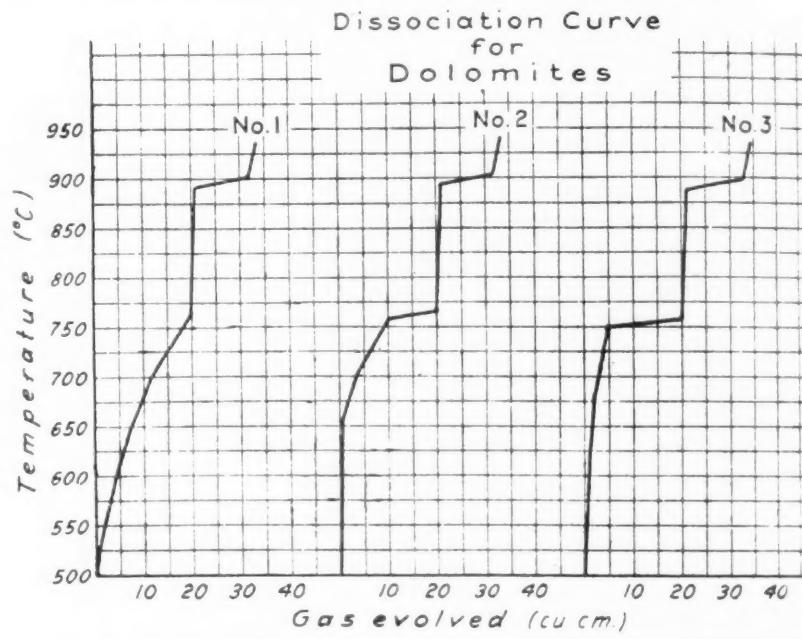
The weather test outlined was applied to two dolomites widely different in physical characteristics. No. 1 and No. 3, whose calcination curves are shown in Table I, were chosen, together with a so-called Canadian magnesite with the following composition:

MgCO ₃	CaCO ₃	SiO ₂	R ₂ O ₃
78.05%	20.10%	1.60%	.70%

The ores were calcined at 750 deg. C. in a retort as described and made up into a stucco mix. The results of the weathering tests are shown in Table III.

	TABLE III
	No. 1 No. 3 No. 4
Tensile strength (14 days).....	630 825 538
Wet strength	330 300 234
Recovered strength	486 410 535

The recovered strength of No. 4 was remarkable, No. 1 very satisfactory, while No. 3, in spite of its high dry strength, showed an unsatisfactory recovery.



800 deg. C. Floors were laid using this material together with suitable filler. The material set up in four or five hours too stiff for further troweling and was in use the second day after laying. These floors have been in service two years and are in perfect condition and giving good satisfaction.

Stucco

Realizing that an ore containing, when burned, only 28 per cent of MgO and as much as 70 per cent limestone was better suited for a stucco material than for flooring, where in many cases as high as 50 per cent of MgO is preferred in the final composition, experiments were undertaken to determine whether this material would make a good stucco which would resist the weather.

The recovery of No. 1 and No. 4 is superior to 80 per cent of the "magnesite oxides" at present on the market made up in similar mixes. No. 3 would probably prove to be an unsatisfactory stucco material.

Overburning

It was thought desirable to determine whether the portion of the sample in direct contact with the hot walls was being overburned, so an inside cylinder was fixed within the retort in such a manner that the portion in direct contact with the hot walls could be removed separately from the portion in the center of the retort. A sample was calcined at 750 deg. C. in this manner and the free lime determined by the ammonium chloride-potassium permanganate titration process. It was found that the

difference in the free lime was well within the experimental error inherent in the method. The amounts found were, respectively, 0.36 and 0.42 per cent. Physical tests were run on the two samples with the following results:

TABLE IV

	Sample from inner tube	Sample from outer tube
Time of set (final).....	4 hr.	4 hr. 10 min.
Linear change	0.10%	0.12%
Tensile strength { 24 hr.	500	520
(averages) { 14 days.	825	800
Weathering (recovery)	60%	62%

From this data it is evident that there was no overburning in any part of the retort.

The Temperature Range

Since, as previously pointed out, it is more economical to calcine a dolomite at comparatively high rather than at low tempera-

Rock Products

An Opportunity for Crushed Stone Men

THE Rock Island Railroad contemplates the ballasting of 300 miles of roadbed in Oklahoma and wants a competent crushed stone man or company to erect and operate a stone plant, or operate a plant to be erected by the railroad.

This will require the design and erection of a modern and well equipped plant which can give economical production. The railroad will take a contract from 100,000 to 150,000 yd. a year of ballast, running in size from $\frac{1}{2}$ -in. to $1\frac{1}{4}$ -in. A market exists for a considerable amount of the material under $\frac{1}{2}$ -in. and a market for nearly all of it can be worked up.

The plant is to be located at Hartshorne,

Stocks of clinker, or unground cement, at the mills at the end of December amounted to about 2,823,000 bbl. compared with 1,949,000 bbl. (revised) at the beginning of the month.

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the exports of hydraulic cement in November were 108,798 bbl., valued at \$305,212; of this total 108,616 bbl., valued at \$303,781, was portland cement, which was sent to Cuba, 40,373 bbl.; to the other West Indies, 9488 bbl.; to South America, 38,978 bbl.; to Central America, 10,403 bbl.; to Mexico, 6942 bbl.; to Canada, 632 bbl.; and to other countries, 1800 bbl. The total exports of hydraulic cement in 1921 were 1,181,014 bbl., valued at \$4,276,986.

Duralite Co. Acquires Magnesite Plant

THE International Magnesite Products Co. plant at Chula Vista, near San Diego, Calif., has been purchased by the Duralite Co. of Los Angeles, a \$1,000,000 concern, for a consideration of \$150,000.

It is planned to enlarge the plant capacity and more than \$50,000 worth of machinery is already on the way, including several Raymond mills for crushing processes, which will bring the plant capacity from about 75 tons of building material a day to 300 tons. In time the company plans to reach a 2,500 to 5,000-ton daily capacity.

The plant has not been in operation for more than a year, having been closed down because of the difficulties in getting the necessary raw materials for the building stone transported from Magdalena bay. It

ture, it was thought desirable to know the burning range of any given ore. Accordingly, three 20-lb. samples were calcined at temperatures ranging from 700 to 825 deg. C. The following table records the results of the tests:

While the burning temperature did not show great effect on the tensile strength, it did indicate that the lower temperatures gave a better product, as indicated by the change of volume, time of set, and somewhat less clearly, in the weather tests. In no case was there more than 0.45 per cent free lime found.

Whether these results will be borne out in practice can only be proved by time, but the indications would point to the use of properly calcined dolomite as a source for magnesium oxide used in the stucco trade.

Summary and Conclusions

It has been pointed out that:

(1). Dolomites can be calcined in such a way as to liberate the magnesium oxide and leave the calcium carbonate undecomposed by controlling the pressure of the carbon-dioxide.

(2). Dolomites having practically the same chemical composition may differ radically in physical constitution, and an explanation of the cause is offered—i. e., that some dolomites are solid solutions and others double salts, while still others are a mixture of the same.

(3). The best temperature for calcining ore to be used in a sorrel cement was found to be approximately 725-750 deg. C.

(4). Ores high in silica make an inferior cement.

TABLE V

Time of set	700 deg. C.		
	4 hr.	4½ hr.	5½ hr.
Tensile strength	480	520	470
lbs. per sq. in. { 24 hr.	765	800	805
{ 14 days	890	910	875
{ 28 days	Nil	Nil	.05
Linear change { At final set05%	.06%	.12%
{ 48 hr.	765	800	805
Weathering { Dry strength	280	270	250
lbs. per sq. in. { Wet strength	400	380	310
Recovered strength			

Oklahoma, where a suitable ledge of limestone exists. For further details get in touch with R. H. Ford, assistant chief engineer of the Rock Island Railroad at room 809, La Salle Station, Chicago.

December's Cement Output

THE statistics shown in the following table, prepared under the direction of G. F. Loughlin, of the United States Geo-

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT IN DECEMBER, 1922, AND PRECEDING MONTHS

Month	Production (barrels)	Shipments (barrels)	Stocks at end of month (barrels)
January	4,098,000	*4,291,000	2,931,000
February	4,379,000	4,278,000	3,331,000
March	6,763,000	6,685,000	6,221,000
First quarter	15,240,000	15,254,000	12,091,000
April	8,651,000	9,243,000	7,919,000
May	9,281,000	11,176,000	9,488,000
June	9,296,000	11,245,000	10,577,000
Second quarter	27,228,000	31,664,000	27,984,000
July	9,568,000	11,557,000	10,301,000
August	10,244,000	11,664,000	12,340,000
September	10,027,000	11,424,000	11,329,000
Third quarter	29,839,000	34,645,000	33,970,000
October	10,506,000	12,287,000	12,114,000
November	8,921,000	11,349,000	5,195,000
December	6,559,000	8,671,000	3,697,000
Fourth quarter	25,986,000	32,307,000	21,006,000
	98,293,000	113,870,000	95,051,000
*Revised.			

logical Survey, are based mainly on reports of producers of portland cement but in part on estimates. The use of estimates was made necessary by the lack of returns from four producers.

is understood that the company plans to bring up most of the magnesite—the chief ingredient in the material it turns out—from big deposits of the mineral in Lower California.

The Coal Industry

Some of the Things That Are Wrong With the Most Basic Industry in America — Preliminary Report of the United States Coal Commission Rehearses Some Recent History

THE United States Coal Commission was created by act of congress, September 22, 1922. It held its first meeting October 18, 1922. The first publication of its proceedings was issued at Washington, D. C., January 15, 1923.

The first part of this preliminary report rehearses some of the history of the coal industry during the last few years and lays stress on the importance of the industry to the public welfare. Then follows an analysis of the coal industry as it exists today in which the following facts are brought out:

In reality the coal industry includes three inter-related industries—mining, transportation and marketing.

The coal mining industry, in point of numbers employed, outranks any single manufacturing industry and stands next to transportation and agriculture. Approximately three-quarters of a million men are employed in this industry, of whom 90 per cent work underground.

The capital invested, according to the rough figures of the census, is \$2,330,000,000, of which \$430,000,000 is invested in the anthracite region and the remainder in the bituminous fields. There are only 174 producers of anthracite and eight of these control over 70 per cent of the annual output, while there are at least 6000 commercial producers of soft coal, to say nothing of thousands of wagon mines and country coal banks. These producers operate 9000 commercial mines.

Then follows a discussion of the intricate nature of the industry, its labor and transportation problems. The exchange of telegrams between the Coal Commission and the conferences of operators and owners are referred to and the telegrams quoted. The commission has been unable to decide whether the recent "strike" was actually a strike or a lockout.

Car Shortage

The most interesting feature of the report, of course, to producers of sand, gravel, crushed stone and slag, as well as the coal-using industries, is the very illuminating discussion of car shortage, which is here reproduced complete:

An opinion commonly expressed before the commission is that the primary cause of scarcity and high prices of coal is transportation deficiency.

There have been recurring periods of "car shortage," and such periods have generally been accompanied by high prices of coal. There are many other causes for the inadequacy of transportation besides the absence of cars, such as lack of motive power, congestion of yards, terminal facilities, or gateways, single tracks where double tracks

are needed, inability to co-ordinate movement of boats and cars at ports, strikes of railway labor, and severe winter storms temporarily blockading traffic. Any one of these elements may be responsible for what, to the operator at a mine, seems a simple "shortage of cars."

Car shortage occurred at intervals before the war, but since 1910 it has appeared more frequently and for longer periods, and its effect upon prices and coal supply have been more serious. This increase in transportation disability as a factor interfering with the movement of coal is in part due to the depreciation of equipment under the strain of war and labor complications. This important subject—inadequacy of railroad equipment—is under careful study by the Interstate Commerce Commission as well as by this commission, and it is hoped that definite findings and recommendations can be made later.

The so-called "car shortage" is not always due to insufficient coal-carrying equipment alone. In part it has been due to an overload upon the transportation system beyond what that system could reasonably or properly be expected to bear. The period of coal shortage and high prices from the middle of 1916 to March, 1918, was marked by almost continuous complaint of lack of cars at the mines. But the volume of traffic thrown upon the roads as a result of the war exceeded anything in their previous history, and when by the summer of 1918 adequate preparation had been made to handle the traffic all current requirements for coal were met and an unprecedented surplus accumulated in storage.

In the next period of shortage—November, 1919, to late 1920—the roads were called upon to make up for six weeks' stoppage in coal production caused by a nation-wide miners' strike. On November 1, 1919, the union bituminous miners stopped work, and when they resumed, on December 13, the movement of coal was 26,000,000 tons behind the previous year. The railroads were then asked to make up the deficit and to do it on top of the regular current movement of coal and other freight. The extra load came at a time when the export business in coal was unprecedented and when general business was booming. Even so, the railroads could probably have met the demand had it not been for the severe storms of that winter and the switchmen's strike of the following spring. As it was, they established a new record for total volume of traffic handled, and by the end of 1920 the deficit in coal supply had been overcome and the price was again normal.

Since the resumption of work in August, 1922, after five months' cessation, more bituminous coal has been offered for shipment than the railroads have been able to carry, but only by investing money in a transportation system vastly in excess of reasonable requirements may the people of the country expect the railroads to make up within a few weeks the consequences of the five months' suspension of a large part of the coal mining.

At the beginning of 1923 the bituminous coal industry presents to the country its usual contradictions. The one complaint common to most of the coal mining territory is that of "car shortage"; yet the outstanding fact is that in spite of a miners' election day and the Christmas holidays, these coal mines produced in December, 1922, over 46,000,000 tons of soft coal. An actual shortage of anthracite has kept domestic consumers on the verge of a buyers' panic, restrained only by the co-operation of the larger coal operators with the federal and state fuel distributors, yet the 46,000,000 tons of soft coal was probably sufficient for the country's needs for current consumption, even in December, if evenly distributed. The fact that low coal reserves in the hands of the consumers are not being rapidly replenished doubtless adds to the fear of scarcity, yet a full car-supply for the country's soft coal mines, as rated by the railroads, would have furnished transportation in December for more than 75,000,000 tons or 20,000,000 tons more than the country ever took from the mines in a single month. Plainly, "100 per cent car supply," as based on such inflated ratings, would create a car surplus or a coal surplus far beyond the ability of the market to absorb.

Over-Development

Already, in our study, we have come to see that underlying these immediate causes of scarcity and high prices—labor difficulties and transportation deficiency—are other causes; namely, the irregularity of demand and the over-development of the mining industry. These basic factors apply directly only to bituminous coal but indirectly they affect anthracite as well, for anthracite is in competition with bituminous coal and the wage scale in the one industry is influenced by changes in the other.

We find that in the bituminous industry since 1890, the mines have averaged, over the country as a whole, only 213 days out of a possible working year of 308 days. These averages, of course, show nothing as to the relative annual earnings of individual miners or their individual opportunity to work. In 1920, a year of active demand, the average time worked was only 220 days, and in 1921, the year of depression, it dropped to 149 days, with many districts showing a figure much below this average. Over a long period comparatively little of the time lost has been on account of strikes and that in the years when there are no strikes the aggregate time lost from all causes is about as great as in those when strikes occur. In the 23 years over which the statistical record of strikes extends, the time lost because of strikes has averaged nine days a year, or less than 10 per cent of the time lost for all causes combined.

The other attributed cause, lack of transportation facilities during the annual peak of railroad business, commonly known as "car shortage," enhances the cost to the consumer, but it does not explain the short working year for the miners. When the

needed coal is supplied the miner gets it out at one time or another and his work takes so much time and no more. Short working time is the result of over development in the industry. There are more mines and more miners than the needs of the country require.

A cause of part-time operations of the bituminous mines is the variation in demand for the product, in part annual, and in part seasonal. In so far as the irregularity in demand is seasonal, greater in cold weather than in summer, the lost time in summer is unavoidable unless some means can be devised to encourage the storage of coal during the dull months. The seasonal fluctuation in demand varies greatly from one district to another; in some fields of the East it is unimportant; further West it is dominant.

Moreover, our preliminary studies show that even in times of maximum demand the mines as a whole do not work full time. In other words, the mine capacity is in excess even of maximum requirements. Although the country has never been able to absorb in a year more than 579,000,000 tons of bituminous coal, the present capacity of the mines is well above 800,000,000 tons.

The steady increase in the army of bituminous coal miners during the last four years, notwithstanding a lessened demand for their product, is also a fact that stands out in the statistical records furnished the commission by the U. S. Geological Survey. In 1918, the year of maximum coal output, when 579,000,000 tons were mined, 615,000 men were employed in the bituminous coal mines, nearly 622,000 the next year, over 639,000 in 1920, and in 1921, 663,000 mine workers were employed in producing about 416,000,000 tons. To get a year comparable in soft coal output with 1921, we have to go back to 1910, when 417,000,000 tons were mined, and it is significant that in that year less than 556,000 mine workers were employed—or about a million more tons of coal with 100,000 fewer miners.

The difference between 1910 and 1921 may be viewed by the consumer of bituminous coal somewhat as follows: The manufacturer who bought 10,000 tons of steam coal in 1910 paid for the year's labor of 13½ mine workers, whereas if he bought the same amount of coal in 1921 he paid the wages of nearly 16 mine workers. This plainly is not progress, but the mistake must not be made of blaming the miner for a decreased output, for the average miner's daily output in 1921 was 4½ tons, taking the 8,000 commercial miners, large and small, in the United States, and in 1910 his daily output was about 3½ tons, although this difference is attributable in part to the increased use of machines. But in 1910 the average bituminous coal mine was operating 217 days as against 149 days in 1921.

This condition of overdevelopment in mines and of surplus number of miners, is an underlying cause of the instability of the industry. It means unemployment and intermittent employment to the coal miner and a direct loss to him of earning power. It explains his need and demand for a day wage rate higher than the average for most other industries. It has also adversely affected the profits of the operator and imposed a burden on the consumer.

The seasonal character of coal movement is a serious handicap to the railroads in those districts where it is the rule. If the peak demands of the mines are to be met the carriers must provide equipment for which there is no use in the off-season.

The unequal distribution of work between mines, attributed by many persons to the assigned and private car system, is also being considered by the Interstate Com-

merce Commission at this time. By this system, men in one mine may get perhaps only one day's work a week, and others, even in an adjoining mine, may get six days' work, causing discontent and strengthening the demands for higher rates of pay applicable to all.

As for the public, the cost of maintaining an over-developed industry is reflected in the high price of coal. We do not know accurately the extent of burden, but it may well be measured by the cost of keeping in the industry an excess of perhaps 200,000 miners and their families and the excess investment in mines.

The commission is convinced that there can be no permanent peace in the industry until this underlying cause of instability is removed. Diverse causes have apparently promoted over-development and inquiries are in progress as to the relative importance, among others, of the following: The policy of railroads toward encouraging the opening of new mines and new mine fields as sources of revenues; car distribution rules that permit, if they do not encourage, larger capacity than the market obviously requires; the opening of new mines by large consumers; the establishment of freight rates that encourage the development of new fields; shifts in centers of consumption that abandon old fields and encourage new fields; the difference between union and non-union wage costs; large scale suspensions in the unionized fields; and irregularity of demand.

Coal Storage

A preliminary survey indicates that much can be done to overcome irregular demand by encouraging the storage of coal, and the commission cannot stress too strongly the great advantage of coal storage during the spring and summer for fall and winter use. This recommendation should apply to all consumers of coal—the railroads, the public utilities, the industries, and the home—and on the measure in which it may be adopted will largely depend the evenness of distribution and the cost of coal to the public during the season of heavy consumption. In addition, it will contribute to more continuous operation of the mines during the summer, distributing employment more evenly throughout the year, thus tending to stabilize the industry. Coal storage, generally adopted by the consumer, large and small, would benefit the carrier systems of the country by equalizing their load. It should have the effect of reducing the price of coal to the consumer.

Conclusions

The way in which to reduce the overdevelopment of the mining industry is fraught with so many complications, not all of which are evident at first glance, that the commission has not yet had time to ascertain sufficient facts on which to base any recommendations now to be made to the congress. While it might be expected that in an over-developed industry aggressive competition would have driven out mines with high producing costs and forced prices to the consumer down to a minimum, so many such complex factors have operated to prevent the free play of economic forces that a very detailed and comprehensive investigation is required before a valid conclusion can be reached.

The inquiry involves the whole question as to what is best for the people, free competition, government or private ownership, regulation or control in the coal industry. Should the operators in given areas be permitted to combine so that the low-cost mines would furnish the product to the people and the high-cost mines kept in abey-

ance to meet an emergency, properly regulated as to price and profit by some governmental agency, or should this prime necessity of life and business be left wholly to open competition in the market? This problem is of so great moment, with reference not only to theories of government, but also to the economic life of the republic, that the view of the commission must be left to its final report.

There can be no satisfactory agreement as to wage rates and no lasting peace between operators and men unless steadier employment can be provided. There can be no satisfactory solution of our transportation problem as long as the railroads are subjected to sudden peak loads of coal traffic at the season when the demands of agriculture and industry are at their height.

The commission believes that the public interest in coal raises fundamental questions of the relation of this industry to the nation and of the degree to which private right must yield to public welfare. It may be that both private property in an exhaustible resource and labor in a public service industry must submit to certain modifications of their private rights, receiving in return certain guarantees and privileges not accorded to purely private business or persons in private employ.

JOHN HAYS HAMMOND, Chairman
THOMAS R. MARSHALL
CLARK HOWELL
GEORGE OTIS SMITH
EDWARD T. DEVINE
CHARLES P. NEILL

I approve, and if a qualified member of the commission would sign the foregoing report. While appointed and confirmed as a member of the commission, being a federal judge, I could not lawfully at the same time hold the commissionership without authorization by congress. But at the request of the President, and of the commission, I have been present and advised with the commission in all its proceedings, without having qualified as a member of it.

SAMUEL ALSCHULER

Aggregate Strength and Concrete Strength

STUDIES have been conducted at the University of Texas on the subject, "Aggregate Strength No Measure of Concrete Strength," which included 28-day and three-month tests, reports the Experimental Station Record, Department of Agriculture.

The course aggregates studied covered practically the entire range from the hardest to the softest aggregates available in Texas for concrete construction. The series consisted of 300 test specimens, including six different aggregates and five different proportions of cement for each aggregate.

It was found that, for the materials tested and for the proportions of cement ordinarily employed in practice, the strength of concrete varied only slightly with the strength of its coarse aggregate. For very rich mixes and high ages the strength increased slightly with the strength of the coarse aggregate, but for ordinary mixes and an age of 28 days, the strength of concrete made with comparatively weak limestone aggregate was as high as, or higher, than that of similar concrete made with strong igneous rock aggregates.

The Design of Sand Plants

By Edmund Shaw
Consulting Engineer, Chicago

No. 4—Why the Automatic Discharge Sand Settler Gives Cleaner Sand Than the Ordinary Settling Box and How It May Be Applied to Plant Design

In the foregoing numbers the settling box, or bin, has been described, examples of different types have been given and it has been shown how such boxes may be designed to settle certain sizes of sand and permit the fine sand, which is not wanted in the finished product, to overflow and be carried away with the dirt in the waste water. In this number the automatic sand box will be discussed, with some of its applications to plant design.

The automatic settling box is a very old device, and one form was patented in 1854, almost 70 years ago. Perhaps 50 different patents have been taken out, since that date, on various forms of automatic settling boxes and special parts, such as the discharge valve.

The first settling box referred to was a cube in shape. It was divided into two parts by a slanting partition, supposedly placed at such an angle that the settled sand would slide on it to the discharge valve. On one side of this partition was the compartment for settling the sand and on the other a counterweight of stones or sand. The box was hung on two bearings so that it could swing.

In Fig. 19 is shown the operation. When the weight of the settled sand is sufficient to overbalance the counterweight, the top of the box swings forward, drawing the discharge orifice away from the beam that closes it and allowing the sand to run out. When the weight of the settled sand is not enough to overbalance the counterweight, the box swings back to the original position and closes the valves.

This original, crude form is still in use, but it has been largely superseded by improved forms, many of which are only refinements of the original. In the series, "Sand Settling and Sand Settling Devices," printed in Rock Products in 1921, a number of these forms were described and the different methods by which they operate were discussed.

There are two advantages in the use of the automatic sand settlers over the ordinary sand bin or settling box, such as has been considered in the previous numbers of this series. The first is that it gives better dewatering of the sand and the second is that it gives a better removal of the clay, silt and fine sand, which is to be washed out.

In the issue of December 16 it was mentioned that one of the difficulties of the successful use of the ordinary sand bin was that of training the men to handle the discharge valves properly. They would leave the valves open too long, so that dirty water entered the car which was filling, or they would keep them too tightly closed, so that a lot of good sand, which should have been settled, ran out with the overflow. It is probable that the original inventor of the automatic sand settler had seen this difficulty, and that he designed his machine to remedy it. All that he had in mind was better dewatering, for in those

low bed. The upper part of this box is filled with water that is kept in motion by the passage of the current, so that the clay and dirt does not settle. Then comes a deep zone of quiet water in which the clay and fine sand settle freely, and finally the sand bed.

The settling of the sand through this zone of quiet water causes the clay to settle more rapidly, each grain of sand acting as a nucleus for the formation of fine clots of clay which accompany it to the sand bed. This settling effect of sand in clayey water is something that has been much studied in other industries than the sand

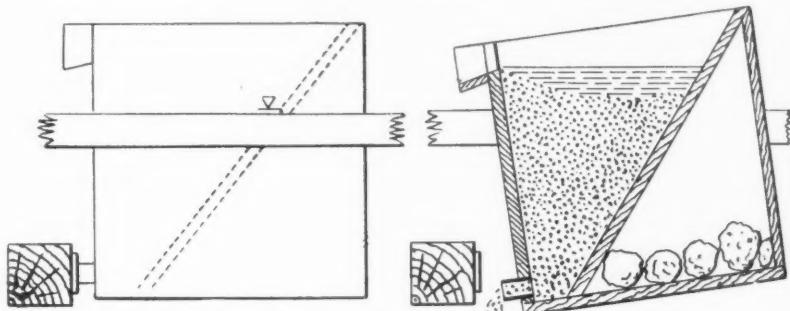


Fig. 19—The original sand settler with automatic discharge, invented 70 years ago

days the art of washing and grading sand was only in its infancy.

But he accomplished considerably more than this. By keeping a high sand bed in

and gravel industry. Those who prepare china clay for the market and the men in charge of certain metallurgical processes have gone into the matter thoroughly, and can give exact figures as to the influence of certain percentages of fine sand on the settling rate of the clay.

In the second box in Fig. 20 it is shown how the "clay catcher," the zone of quiet water, has been entirely displaced by the high sand bed. Above the bed there is only the zone of agitated water through which the current is passing, in which the clay and fine sand will not settle at all. Hence the automatic sand settler which automatically keeps this high sand bed is bound to produce a cleaner product than the ordinary sand bin.

Considering that there is no zone of quiet water one might wonder how the clay gets into the sand in any degree, in an automatic sand settler, until he remembers the voids. It is not the intention in this series to dis-

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March 10 issue of

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the settling box all the time, he prevented the settlement of a great deal of clay and fine sand which was not wanted in the settled product.

The advantage of keeping a high sand bed in any form of settler is shown graphically in Fig. 20. The first box shows a

cuss the theory of settling any more than is necessary to an understanding of design, but a word or two on the reasons for the settling of clay with sand may not be out of place. The voids in settled sand may easily be 25 per cent of the space occupied

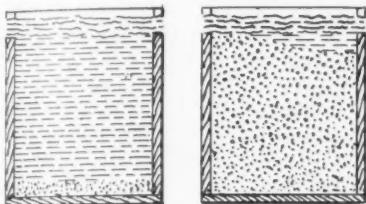


Fig. 20—A high sand bed fills the space in which there would otherwise be a zone of quiet water, through which clay would settle freely

by the sand. These voids must contain water, and if the water contains clay this clay will accompany the water in the voids.

Another reason for the presence of clay in settled sand is that some of the effect of the settling of clay by sand is always present, even where the water is agitated. With the dilute solutions of clay found in sand washing plants, this effect is not noticeable, but it is very noticeable in dealing with heavy mixtures of clay, such as are found in the washing of phosphate rock, for example.

The Automatic Sand Settler Is Reliable But It Has Its Limitations

As in the case with every machine, the automatic settling box has its limitations, and these ought to be understood before one of them is incorporated in a plant design.

The first limitation is that of its inability to handle certain classes of material. It will not work at all on sand which settles with a great deal of clay, so that a pasty mass is formed. Such a pasty mass will adhere to the sides of the settler and will not slide down to the discharge opening. But material which contains so much clay as this cannot be considered "washed" sand

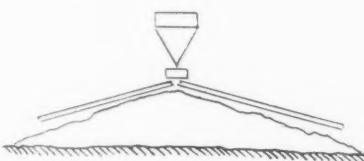


Fig. 21—The discharge from an automatic sand settler will flow like a thick liquid and can be spread over a large area

even though it has been passed through water.

It does not do very good work on extremely fine sand (say all finer than 100 mesh). This statement ought to be qualified, as the writer has seen automatic settling boxes doing quite satisfactory work on

such fine material, but commonly they do not do good work when so applied. In handling such fine sands it is essential that the clay be thoroughly removed before the sand is settled.

A third limitation is that of the headroom required by the machine. There is no way to avoid this, and the designer has his choice between giving up the headroom to the automatic settler and using one of the machines which dig out the settled sand and elevate it above the water level of the settling box.

A word ought to be said about the reliability of such machines, since a few operators have claimed that they have found them unreliable. The writer has had a great deal of experience with automatic sand settlers and has found them quite reliable.

sand in the bin due to the flowing of the sand discharge.

It is with ground storage that the full advantages of the automatic settler is realized. It may be set in such a way that it will cover a large area, or it may be placed to build a long and narrow stockpile, according to the particular method of reclaiming that is to be installed.

The discharge of an automatic sand settler is not fully dewatered. Since the sand is settled in water, the voids must always be full of water, and the voids in the discharge are slightly more than in settled sand, because the sand is discharged in a running stream. Ordinarily the discharge will have a moisture content of 25 to 30 per cent.

Such a mixture will flow in a trough like



Fig. 22—An automatic sand settler mounted on a truck may be moved to build a long stock pile

liable when they were operated by men who understood them and who looked after them and gave them attention when attention was needed. It is not uncommon to find two plants in which the same type of automatic sand settler gives very different results, although working under almost identical conditions.

In adopting the automatic settling box to plant design we have to consider its use in two ways, with loading bins and with ground storage. It is not so well adapted to use with bins as with ground storage, for the reason that the headroom it takes cuts seriously into the storage space. A bin from which railroad cars are to be loaded must lose 11 ft. or so in height to allow the cars to pass under the spout, and if the bin is of the type that is built over the track it must lose from 17 to 25 ft. of height for car clearance, according to the requirements of the particular railroad which handles the cars. If 8 or 10 ft. has to be added to this for headroom for the automatic settler, we have reached a considerable elevation without providing for any storage at all. But this loss of headroom is in part compensated for by the spreading of the

a thick fluid, something like molasses. It requires a considerable grade to flow freely, the limiting grade depending on the nature of the sand. A safe grade is $3\frac{1}{2}$ in. to the foot, about 15 deg. If it is desired that the stockpile shall cover a large circular area, troughs may be hung on this grade, something like the troughs used in pouring concrete from a tower. By means of suitable openings in the troughs the sand may be taken off at any point so that the whole area may be covered. This arrangement is shown in Fig. 21.

How the Machine May Be Set to Build a Long Stockpile

For building a long and narrow stockpile on the side of a railroad track, for example, there are two methods. One of these is to mount the automatic settler on a truck which runs on a trestle above the pile. The other is to use a number of stationary automatic settlers, either in series or in parallel. Both methods are in use. The illustration, Fig. 22, reprinted from the issue of Rock Products of December 2, shows an automatic settler mounted on a truck to be moved along the stockpile.

The arrangement is diagrammed in Fig. 23. The feed stream is brought in on one side, crosses through the automatic settler, which removes the sand and then passes to the overflow trough on the other side. There are gates in the trough on the feed side from which the feed may be taken off.

In the writer's opinion this is not so good a method as the use of stationary settlers. The trestle has to be a solid and well built structure to support the rails and the movable settler and its truck. And there is too much of it, for it gets in the way of the

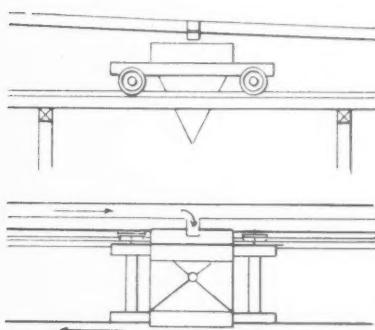


Fig. 23—A modern type of automatic sand settler on a truck mounting. The waste launder is omitted from the elevation to show the truck

machine that is used for reclaiming the settled sand.

Fig. 24 shows three tanks mounted in such a way that they may be used in parallel or in series. They are fed from a common trough which is supplied with gates of the "splitter" type so that any part or all of the feed may be sent through any gate. If there is sufficient feed for all three, each takes a third, but if the feed is only sufficient for one then each is worked in turn, as it becomes necessary to fill that part of the stockpile which is beneath it.

The Reclamation Method Determines the Kind of Stockpile to Be Built

The method of reclamation has been mentioned as determining the type of mining the type of stockpile that should be built. There are three such methods to consider, the use of a belt conveyor, a locomotive crane, or similar machine, or a mechanical loader of the traveling bucket type.

Very few "straight" sand plants go to the expense of belt conveyor systems for recovering storage. But if such a system be used care must be taken to see that the belt will draw its load from different parts of the stockpile, so that it may always draw from a part of the pile which has been drained of the water.

The locomotive crane is an integral part of many sand plants, and its use has already been discussed in connection with those forms of sand settlers in which the elevation must be kept low in order that the pump should not work against too high a head. Used in connection with automatic

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settlers, the arrangement is very simple. A long pile is built beside the track on which the crane travels and the sand loaded from this pile into cars on the other side of the crane, or on the same track. By having a long pile and by placing the settlers as in Fig. 24, the sand may be filling into the pile at one part while it is loading out from another part.

In one plant, which it was necessary to design so as to keep the elevation of the material strictly below a certain height, the crane is used to load into and out of the stockpile. There is room under the automatic settlers for only a small storage pile, containing a few hours' run. Naturally, such an operation cannot be so low in cost as one in which the crane handles the sand but once, but in the case of a plant of small daily production (under 500 tons) it may be justified. The crane is on the ground and its operators are paid by the day, so that the cost of handling the material in

these machines which could be "swiveled" and otherwise manipulated so as to bring it against any part of the piles, and it had a capacity of 45 cu. ft. per minute (say 125 tons per hour), which is ample for the needs of the ordinary plant. This type of loader is particularly adapted to plants which supply a trucking trade, as both loader and truck are mobile and can be moved to any part of the stockpile. It can be used, however, for loading into cars, especially in connection with a portable belt conveyor, another machine that has recently been much improved. Sand and gravel plants in California and other places have used this combination of portable loader and portable conveyor very successfully. In passing, it may be noted that the method has been used for handling coal as well.

Where trucks have to go on the ground covered by such a stockpile as has been described, it is almost always necessary to pave the ground with concrete, or to put in some other form of paving which will not be affected by the water which drains from the sand. If this is not done the ground soon becomes like a bog into which the wheels of the truck and loader sink until operating these machines becomes almost impossible.

Drainage is an important matter, and in laying out the plant the ground which the stockpile is to occupy should be chosen for

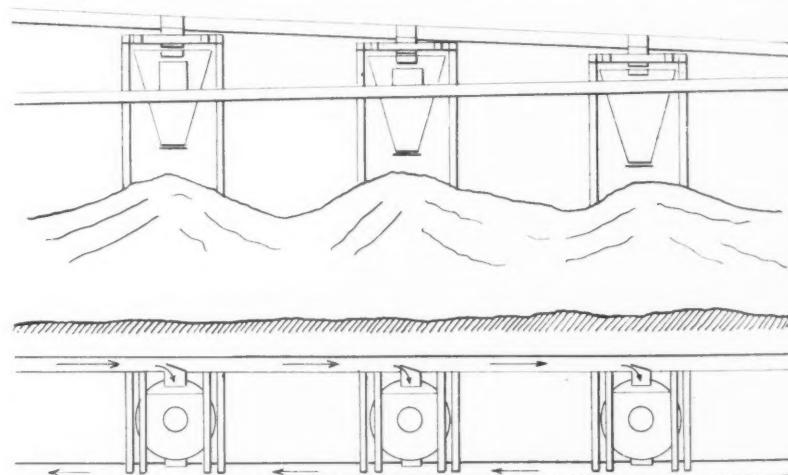


Fig. 24—Three automatic sand settlers, fed by "splitter" gates, set to build a long stockpile

and out of the pile does not much exceed the cost of handling it only once, when it is loaded on the cars. But in larger operations, the plan of building the stockpile directly from the automatic settlers should be followed.

The use of mechanical wagon loaders for reclaiming material from stockpiles is increasing, and the designers of these machines are continually building them of larger capacity and better adapted to the work. At the recently Good Roads Show in Chicago there was shown a new type of

the certainty with which it may be drained. The amount of water which will drain from a pile which is being built from automatic settlers is not inconsiderable. Experiments made to determine this showed that from a production of 1000 tons per day (8 hours) about 90 gallons per minute would be draining continually while the automatic settlers were discharging. It may be noted that this drainage water is filtered water, as clear as crystal, and that sometimes a use may be found for it in another part of the plant.

(To be continued)

Rock Products

Indiana Stone Men Hold Annual Convention

THE annual meeting of the Indiana Crushed Stone Association was held in Chicago, at the Hotel La Salle, January 16, the second day of the National Crushed Stone Association's convention.

All of the members were present and were most enthusiastic throughout. Activities of the past year were reviewed by general discussion in which all members participated, giving their individual views of how the activities of the association should be conducted during the following year. Considerable time was given to arranging a tentative program for the coming year, including resolutions covering proposed action.

Following the general meeting the annual election of officers was held and the following officers elected:

C. E. Greely, secretary and treasurer, Greely Stone Co., St. Paul, Ind., president; V. G. Pogue, president, Spencer Stone Co., Indianapolis, treasurer; Fred W. Connell, Indianapolis, executive secretary.

The executive committee are: Chairman, E. B. Taylor, manager, Mid-West Crushed Stone Co., Greencastle, Ind.; H. E. Bair, manager, France Stone Co., Toledo, Ohio; V. G. Pogue, president, Spencer Stone Co., Indianapolis; George H. Balfe, manager, Monon Crushed Stone Co., Monon, Ind.; J. E. Baney, manager, Newton County Stone Co., Kentland, Ind.

Sun Portland Cement Co.'s New Plant

THE Sun Portland Cement Co. has started construction on a new plant near Home, Ore., on the Oregon Short Line Railway. It is expected that the plant will be operating not later than August. The company will shortly be incorporated under Nevada laws with a capital stock of \$1,000,000.

Those interested in the project are H. A. Roth, Victoria, B. C.; L. C. Newlands, Oswego, Ore.; George MacDonald, Portland, Ore.; and H. L. Knappenberger, Rome, Idaho.

Business Men Attack Immigration Ban

MANUFACTURERS from various sections of the country appeared before the House Immigration Committee at Washington on January 4 to urge amendments to the present 3 per cent immigration law in order to relieve the present labor shortage by the admission of a higher quota of desirable immigrants.

James A. Emery, general counsel of the National Association of Manufacturers, presented the situation for the national body and also for 39 state associations

represented in the national industrial council, besides other individual state organizations.

Mr. Emery pointed out that for a hundred years or more this country had been drawing on the other nations of the world to do its rough labor; that native born American labor is growing more loath each generation to do the pick and shovel or other hard work their immigrant ancestors did.

Brazilian Cement Market

ALTHOUGH there is an excellent market for cement in Brazil it has not been exploited successfully by American cement manufacturers, says *Commerce Reports*. Scandinavian and German merchants control the Brazilian trade in this commodity. (Commercial Attache W. L. Schurz, Rio de Janeiro.)

\$1,500,000 Improvement for Bonner Plant

IMPROVEMENTS amounting to \$1,500,000 will be made on the Bonner Portland Co. plant at Bonner Springs, Kans., it was announced by Holger Struckman, president of the International Cement Corp., New York, which recently purchased the plant.

The chief improvement will be to change the process from "dry" to "wet." The plant will be enlarged, employing 500 men instead of 165, as in the past. Engineers have begun work on planning for larger kilns, the new process, and other radical changes.

The plant is on a 300-acre tract rich in shale and limestone used in manufacturing cement. The plant will be incorporated as a Kansas institution and a state charter has been applied for.

Schaffer Co. to Install Two Lime Plants

A CONTRACT has been signed recently between the Kouri Calcium Co. and the Schaffer Engineering and Equipment Co., Pittsburgh, whereby these engineers will install a lime plant for the former at McGregor, Texas. This plant is to be one of Schaffer's latest designs, embodying all of the latest features for producing high-class lime products. It will be automatic in practically all of its operations.

The plant will have a capacity of 200 tons daily, with provisions for making additions. It will be located at the base of a great hill of coral formation lime rock with a purity of 99.4 per cent. The plant should be of great benefit to Texas, not only in the way of furnishing a high-class material for building purposes, but for agriculture as well.

The Schaffer Company will also design and install a lime and crushing plant

for the O'Neal's Lime Works, Inc., at Birmingham, Ala. It will have a capacity of 400 tons of lime per day and from 2,000 to 3,000 tons of crushed stone, and will be of the most modern construction. Its supply of raw material consists of an immense deposit of high calcium rock having a purity of 99.14 per cent.

Fine Program for Sand-Lime Brick Producers

THE nineteenth annual convention of the Sand-Lime Brick Association, to be held at Grand Rapids on February 8 and 9, promises a most interesting and instructive program. President John L. Jackson is urging a full attendance of members and all others interested in the association's work at all four sessions.

Papers have been prepared by I. G. Toepfer, Acme Brick Co.; J. M. Zander, Saginaw Brick Co.; W. H. Crume, Crume Brick Co.; Robert Marshall, Canadian Inspection and Testing Laboratory, Toronto, Ont.; D. D. Wood, Wood's Brick Co., Winnipeg, Man.; J. S. Palmer, Sebewaing Sandstone Brick Co.; John Graham, Jackson, Mich.; J. A. Bullman, Alsip Brick and Supply Co., Edmonton, Alta., and Warren E. Emley, U. S. Bureau of Standards.

There will also be a round table discussion conducted by W. K. Squier, Paragon Plaster Co., Syracuse. Among the topics suggested are: Scale on cars; collapse of building; American Clay and Cement Corporation fire; lime hydration; margin of safety in the manufacture of brick in absorption; lime specks; new rotary press; Mr. Toepfer's rod mill; how has Hummelstown been able to get so much business? etc.

Recent I. C. C. Decisions

Rates on Sand.—The Commission has dismissed No. 12465, Silica Sand Producers' Traffic Association et al. vs. Chicago, Burlington & Quincy, and seven other complainants bracketed with it, holding rates on sand from Ottawa, Oregon, Millington, Utica and Wedron, Ill., to destinations in Indiana, Michigan, Ohio and New York not unreasonable.

Rock and Granite Rate.—The Commission has dismissed No. 12024, Arizona Packing Co. et al. vs. Director-General, opinion No. 7959, 73 I. C. C. 713-14, holding the rate on crushed rock, sand and gravel, from Tempe, Ariz., to Cactus, formerly Portland, Ariz., during federal control, were not unreasonable or otherwise unlawful.

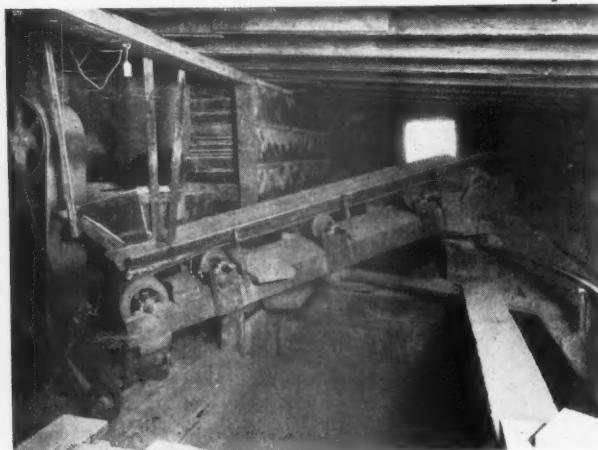
Frozen Sand Rule.—The Commission has dismissed No. 12660, Missouri Valley Association of Sand and Gravel Producers vs. Arkansas Valley Interurban et al., opinion No. 7935, 73 I. C. C. 615-17, holding the rule governing imposition of demurrage charges on frozen shipments not unreasonable.

Hints and Helps for Superintendents

A Pivoted Belt Conveyor

A CLEVER device for distributing stone of different sizes to the proper bins has been worked out at the plant of E. H. Bradbury in Kansas City, Mo. The location of the plant in the heart of the city makes dust a great nuisance, and therefore the elevator for reclaiming the stone to be distributed is made as low as possible in order to minimize the cost of enclosing it. This consideration made it impracticable to install an elevator high

belt conveyor shows how it works. The bucket elevator discharges into a hopper at the fixed end of the conveyor and the belt carries the material to the desired bins. This belt is on a framework which swings through an arc of about 90 deg. on a track of curved channel iron 9 ft. in radius. The support can be swung around to any bin very easily. This swinging feature is accomplished without affecting the drive of the belt by clever adaptation of the ring gears, pinions, and differential case from two automobiles.

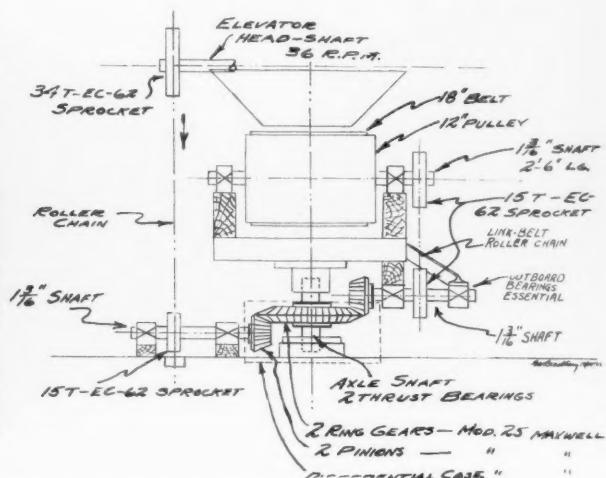


Local conditions made ordinary methods of filling bins impracticable, so this ingenious swinging belt conveyor to discharge into any one of three bins was designed and installed.

enough to chute the stone directly to the bins. The elevators were made necessary in the first place because it was desirable at this plant to reclaim the various sizes of stone separately or in mixes of varying proportions and to have these single sizes or mixtures in bins ready for loading as necessary. Also, the loading bins were limited as to the depth to which they could be located by the contour of the ground and the necessity of providing an exit for trucks at the higher level of the property over a reasonable grade, as explained in the leading article of this issue.

The screen and initial bins form one section of the plant, while the loading bins, forming the other section, are built considerably higher with chutes from the initial bins leading to a bucket elevator which raises the stone to the top of the loading bins. Here a short swinging belt conveyor has been designed and installed which will distribute the material to any one of three loading bins merely by swinging the conveyor about the axis on which it is pivoted.

The photograph and elevation of this



plug for filling, and the bottom has same opening as the injector line."

The device was designed and installed by T. P. Ward, general foreman of the company's Clay Center plant. He passes it on with the hope that it may be of some benefit to others. This undoubtedly will be of value to all steam shovel operators who have encountered water troubles, but particularly to those whose shovels are not equipped with scale chambers.—*The Excavating Engineer*.

How to Inject Compound into Boilers

A DEVICE for feeding boiler compound into steam shovel boilers has been in use at the operation of the Kelley Island Lime and Transport Co., Clay Center, Ohio, for the past six months and has proved satisfactory. The company writes as follows:

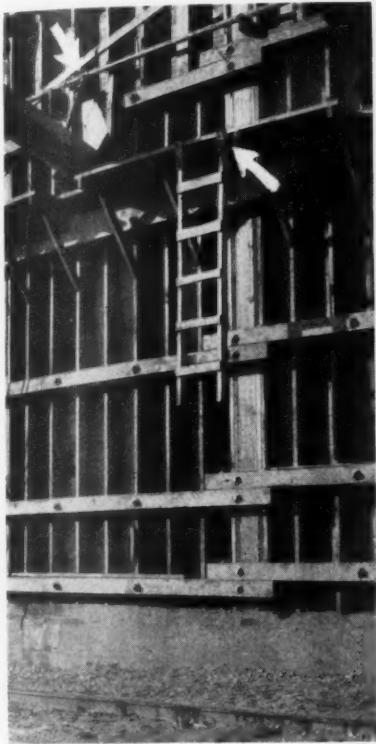
"We found that by putting compound in the water tanks of our shovels the greater portion of it settled in the bottom

Water at the Loading Spouts

GOOD use of a 2-in. pipe line over the loading chutes is shown in the accompanying illustration of the Champion Sand and Gravel Co. plant at Pound, Wis. There are four loading chutes, three for gravel and one for sand. Over each gravel gate is a 2-in. pipe with a valve, and while the gate is open and the gravel being loaded a 2-in. stream of water under pressure plays on the gravel in the chute.

giving it a final and thorough washing. The material is washed once at the top of the plant in the cylindrical revolving

plant can be used at the gate opening to loosen up the material and start and maintain an even flow whenever the sand does not run out well.



Arrows point to a useful water pipe line on the plant and to a handy ladder for reaching the gates from cars below the loading spouts

screen, but this final rinsing makes the washing a thorough one.

From the sand bin there is the occasional tendency of the sand to stick at the gate which many operators experience. A hose attached to the pipe line on the

A Quickly-Hung Ladder

MUCH time can be saved in climbing from cars being loaded to the platform at the loading spouts if a convenient arrangement is made. Loading is speeded up considerably at the Pound, Wis., plant of the Champion Sand and Gravel Co. by a five-rung home-made ladder which is simply hung from the platform by two leather straps.

This plan, shown in the accompanying illustration, looks a little dangerous at first glance, but the dozen heavy spikes used in each strip of leather holds the ladder solidly to the platform. The leather is extra heavy, cut from a piece of belting, and each strip is about four inches wide and a foot and a half long.

Loading Evenly and Quickly

GIVING a maximum load of stone to a 5-ton truck in less than a minute is the record at the E. H. Bradbury crushing plant located in the heart of Kansas City, Mo. A swivel loading spout is largely responsible for making possible this record, as the spout loads the truck evenly without anyone on top of the load to spread.

This spout, which was designed by G. V. Bradbury, can be swung back and forth by means of a rod by the same man who operates the sliding bin gate and this motion perpendicular to the axis of the truck gives an even load at both sides of the center without excess material piled in the center to fall off later.

The design of the loading spout is

shown in the accompanying drawing. The top corners are necessarily cut off at an angle of 45 deg. so that they will not interfere with the spout from the bin or the sliding gate as the loading spout is swung from side to side.

Quick Repairs to the Pump

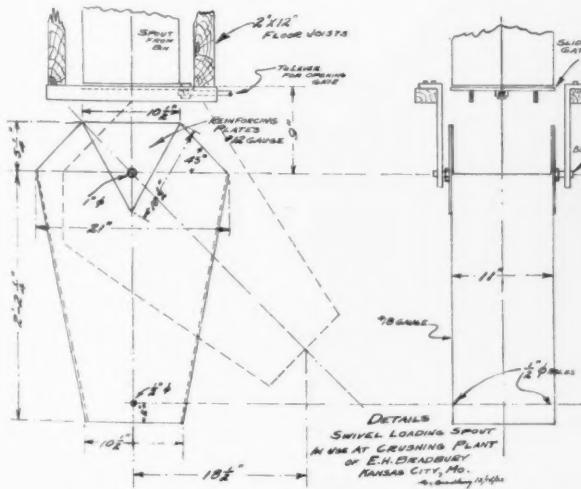
A BOOSTER pump occasionally needs attention, and when every minute the pump is not working means the loss of two tons of production it is economy to make provision for getting at the pump



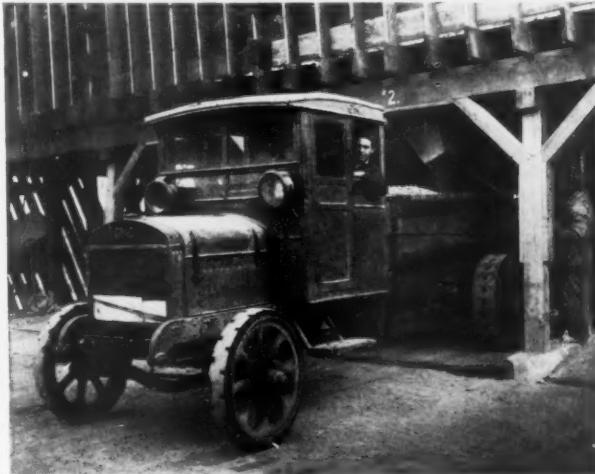
This extra size stone box makes repairs to the booster pump easy, and the time saved means extra dollars of profit

rapidly and easily. An ordinary stock stone box in the pipe line where it enters the pump from the dredge may be used, but the standard size of stone box is too small to allow a workman free access to the pump.

To overcome this difficulty a special size stone box was designed by W. J. L. Roop, of the New England Sand and Gravel Co., for use at the West Peabody, Mass., plant. The cover of this box is held on by bolts and nuts with a leverage arm, making it possible to remove the cover quickly and without a wrench. When opened the box gives ample space to get at the interior of the pump for work which may be necessary.



One operator can handle the sliding bin gate and the swinging loading chute to give a maximum evenly distributed load in a minimum of time. This means money saved, since the time of truck and driver are valuable.



Marketing Agricultural Limestone

Producers Hear "Selling" from All Angles
at the Association's 1923 Convention

ENTHUSIASTIC and optimistic, the National Agricultural Limestone Association in its convention at Chicago on January 17 and 18 opened a campaign for membership which resulted in an immediate increase of 25 per cent in number of members. The campaign will be continued to include invitations to every limestone producer in the country who is selling or contemplates selling limestone for agricultural purposes.

On the two days preceding the convention, luncheons were held at which agstone producers who were attending the convention of the National Crushed Stone Association assembled to discuss their common problems. At the first of these luncheons a round-table discussion brought out many problems which various producers face, and many of these were solved from the experience of others present.

President Lamkin pointed out the need for better marketing methods in the industry, and gave some cautions to those who plan to start marketing this product. Portions of President Lamkin's remarks are published below.

R. C. Faulwetter, of the research department of *Ohio Farmer*, presented some interesting facts on the analysis of markets for agricultural limestone. His talk was illustrated by maps showing an analysis of these markets.

At the second day's luncheon, W. A. Ostrander, director of soils at Purdue University, spoke on the need for more intensive marketing of agricultural limestone, and Professor Bower, of the University of Illinois Agricultural College, described some experiences in Illinois with the use of this product.

Still more help in the marketing of agstone was presented at the association banquet in the form of a suggested marketing program for individual producers. R. S. Newman, of *Ohio Farmer*, worked out the details of this plan in his talk following the banquet. This plan is published below.

Dr. Whiting, of the Richporpoor Co., demonstrated a simple test for soil acidity by shaking a small quantity of soil in a tube with a specially prepared liquid. Field kits making possible a large number of tests are available at small cost.

J. C. King, chairman of the board of the association, traced in an interesting manner some of the early developments in the agstone industry, and Secretary A. P. Sandles, in his eloquent way, offered the advantages of association membership to all producers. President Lamkin clinched the argument

for the advantages of membership, and several applications for membership were received. At the business meeting of the association on Thursday, the old officers were re-elected, with the exception of treasurer, in which position W. H. Margraf, of the Marble Cliff Quarries Co. was elected to replace W. H. Hoagland, general manager of the same company. The other officers re-elected are E. M. Lamkin, Kelley Island

seemed unimportant, as there has been only a small consumption of this material by the farmers. But the farmers are learning that it is almost useless to try to produce crops on a soil that is acid. The acid must be neutralized, and limestone is the product that will do it. If this waste material can be disposed of at a profit, it is folly to allow it to accumulate. If 12 to 15 per cent of your crushed stone is fines and you are dumping it on a stockpile, then just that amount of your turnover is lost. A by-product ceases to be a waste material just as soon as there is a market for it. Consider it no longer a by-product, a necessary evil, but turn it into profit. This does not mean dispose of it at any price, but market it at a profit. As it has ceased to be a by-product, it must, along with the other stone, have a production and selling cost.

You cannot take the by-product of your plant and dump it on the farmer at a high price and continue to reap a profit. First, this product must be put in a salable condition. This can be done and the material disposed of as three grades of agricultural liming material. First and most common, but no doubt not the best, is screenings. The word "screenings" has covered a multitude of by-product stone, and therefore is now looked upon by the farmer with suspicion, and well he can afford to be careful as a lot of screenings bought by the farmer weren't worth the freight he paid on them.

Those who have a calcium stone—not necessarily a high calcium content—can successfully build a business with agricultural screenings. They should be not less than 95 per cent pure. By that I mean free from foreign matter. Of course, a reasonable amount of magnesium is certainly of no disadvantage, providing the stone is soft and soluble. Solubility, fineness and purity are the three prime requisites of an agricultural limestone. Therefore, 100 per cent of the screenings you offer for sale should pass a quarter mesh sieve, and from that down to dust. Of course, the greater the amount of dust the better the product. A hard, insoluble dolomitic stone should never be sold as screenings, as the farmer will get poor results and, of course, this will act as a boomerang to yourself and the industry.

The next finer product we find on the market is known as agricultural meal. According to the Ohio State Agricultural law, agricultural meal is a limestone of such a degree of fineness that 100 per cent shall pass a 4-mesh sieve, 80 per cent shall pass a 10-mesh sieve, 30 per cent shall pass a 50-mesh sieve, and 20 per cent shall pass a



E. M. Lamkin, re-elected Agstone Association president

Lime and Transport Co., president; R. J. Fuller, Columbia Products Co., vice-president; A. P. Sandles, secretary; Claude L. Clark, assistant secretary; J. C. King, of the Carbon Limestone Co., chairman of the board.

Money was appropriated to establish a reference library at headquarters of the association on every phase of agricultural limestone, and a member of the Ohio State University will be retained to establish and maintain the library. A \$2000 fellowship in agricultural limestone at the Ohio State University was proposed and Professor Baer will bring to the association the university's action on the plan at the next association meeting, which will be held at the Fort Pitt hotel, in Pittsburgh, early in February.

The President's Address

Following are extracts from the talk of President Lamkin:

To many quarry men the production of limestone for agricultural purposes has

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100-mesh sieve. This is a little finer than screenings, but not fine enough to permit the use of the harder stones.

That which is considered pulverized agricultural limestone is fine enough to permit the use of almost any CaCO_3 and MgCO_3 product, regardless of the hardness. In this material we have two classifications, that in which 95 per cent passes a 10-mesh sieve, and 30 per cent through a 100-mesh sieve, and a much finer product—of which 100 per cent passes a 10-mesh sieve, and 60 per cent through a 100-mesh. The 60 per cent through a 100-mesh sieve is invariably a kiln-dried product and worth considerably more than the 30 per cent through a 100-mesh sieve, as that isn't necessarily run through a kiln and may contain considerable moisture.

Before attempting to put in a drier and pulverizing plant the possible market should be investigated and if that is satisfactory, the yearly screenings production should be considered. If the production is small, while the quality comes up to the standard, it would be better to market the product as screenings. A large production is by far better marketed as pulverized limestone provided a fair price is maintained. Of course, there is no reason for selling any manufactured product at a loss. Cut prices never built a substantial business in any industry. Therefore we can't expect to progress with that method in this industry, either.

For your benefit I will give you here about what the sieve tests of the different materials should be:

For screenings:

100 per cent should pass a $\frac{1}{4}$ -mesh sieve
65 per cent should pass a 10-mesh sieve
25 per cent should pass a 50-mesh sieve
20 per cent should pass a 100-mesh sieve

For meal:

80 per cent should pass a 10-mesh sieve
30 per cent should pass a 50-mesh sieve
20 per cent should pass a 100-mesh sieve

No. 2 pulverized limestone should pass

95 per cent through a 10-mesh sieve
50 per cent through a 50-mesh sieve
30 per cent through a 100-mesh sieve

No. 1, the finest, should pass

95 per cent through a 10-mesh sieve
70 per cent through a 50-mesh sieve
60 per cent through a 100-mesh sieve

It isn't necessary to have it any finer than this, and to do so will only cut down your production which, of course, increases production cost.

To illustrate the possible sale of these products, consider conditions in Ohio. The Ohio Experiment Station says that Ohio requires 3,000,000 tons of liming materials annually. Available records show the actual consumption is something around 250,000 tons. Ohio isn't buying even 10 per cent of her requirements, and you will find this true in many states of the Union.

Figures furnished by the United States Department of Agriculture show that over a period of 10 years the average wheat production in Europe, in countries where the soil has been tilled for hundreds of years, is far above ours. For instance, the yearly production of wheat for over a pe-

riod of 10 years in Germany is 34 bushels per acre; in England, 38 bushels; France, 28 bushels; Scotland, 38 bushels; and China, 21 bushels, while the same record shows Ohio as only 14 bushels for the same length of time.

This is a pretty low production mark when you take into consideration that it is possible to produce better than 50 bushels of wheat to the acre under proper conditions.

A Program for Selling More Agstone

Here is a constructive program that should broaden the market and increase the sales of agricultural limestone. It was proposed to the agstone producers at their Chicago convention by R. S. Newman, of

**The full Transactions
of the
National Crushed Stone Association
will be published in the
March 10 issue of
ROCK PRODUCTS**

the advertising department of *Ohio Farmer*. Mr. Newman's talk to producers follows:

You are engaged in producing and marketing a commodity for which nature, with the dawn of every new day, furnishes you with an ever-increasing demand. The use of your product is being preached in thousands of meetings every year by the more progressive representatives of this greatest of all industries—agriculture.

With the same effort put forth in a plan to market your product that is used to market any of a half-dozen other commodities where the possible consumption is even smaller, the question of selling the entire quarry production for future generations would soon be one of selecting your customers. There is no mystery about such a selling plan. The stage is set, the press work has been done, the tickets are sold—everything is ready for the performance.

Up to the present time the sale of limestone has been almost exclusively carlot orders, and the thousands of tons that have been sold in the past 10 years haven't even scratched the list of possible buyers for a one year's business. There is not another commodity in this country today that is being so universally advocated by such representative men as are giving their time to agriculture.

Agricultural schools, experiment stations, state and county agricultural associations, and farm publications, have been selling the limestone idea for years. But have you been selling limestone? Have you not just been taking the butter as the other fellow churns it, which resulted in your business being one of a feast or famine? Have you not let unsolicited and unregulated business jam your capacity with eleventh hour orders?

Are not your carlot prices so low that you cannot develop the new business which must be sold in l.c.l. at a higher price.

The first thing you should do is to get thoroughly organized—organized so that you can get your prices up to cover a selling cost instead of just an operating cost. Get your prices up so that you can carry stock in conveniently located storage houses. Get your prices up so that you can sell a man 5 or 10 tons out of a warehouse located within hauling distance; for every 5 or 10-ton sale this year means a carlot sale next year.

I would suggest that the basis of price be on the ton of limestone, including sufficient loading to cover selling, freight, and handling charges and storage, if necessary. Then graduate the price downward in units of 5, 10, 20 tons, etc., to carload lots and multiples of carloads, giving only the buyer of three or more cars the lowest price. You cannot expect to develop new business at the minimum carlot price.

The greatest problem confronting the agricultural limestone producer is one of distribution, and in spite of the fact that there is an ever-increasing demand for your product and that some of you are securing a decent volume of business with your present merchandising methods, the situation is changing so rapidly that today plans must be drawn up which will take care of the business five years from now.

In Ohio, Indiana and Michigan there are 3500 established buying agencies representing more than 500,000 members who, through their organizations, are being taught to buy limestone. Whether you sell through these organizations, or through your own selling agencies, the problem of distribution is one of local stock.

The resistance encountered in marketing limestone is no greater than that which confronts a man who is trying to market any other commodity. The fact is that the resistance is in such form that it can be analyzed, and it's simply a matter of prescribing and applying a remedy for it.

First of all, the producer must be sold the limestone idea himself. He must know what he is selling and have a thorough technical knowledge of its use. Then he must know the farmer. He must know his habits and customs—when he plants certain crops, when he harvests them, and when and how he buys.

The producer of limestone should be cognizant of the influence being brought to bear to create a demand for limestone. He should co-operate with this influence and attempt to mould it so that the response will co-ordinate with his marketing problems.

Let's look into the future for five years. Beginning now, every producer of agricultural limestone should create a budget for promoting intensive sales in his territory, this expense to be derived from a loading in the selling price covering the sales during the next five years. For instance, 50 cents a ton for the first two years, and then

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\$1 a ton for the next three years, would provide a working capital sufficiently large to put the limestone market in good shape. Unlike fruit, limestone is not perishable, and with a solid organization—each member pledging himself not to demoralize the market by business-wrecking tactics—every limestone producer could, five years from now, look with pride upon his achievement.

The most important thing is for the producer to realize that he cannot, or should not, attempt to force the volume by any other methods than those that are in keeping with a well-defined, constructive, and educational plan covering a period of not less than five years in the future.

My suggestion for a plan of distributing limestone is: Establish a price with a margin sufficiently large to interest a reliable man in every locality to act as a dealer. Make a contract with him to stock limestone, as you see fit to ship it. In the contract permit this man the privilege of selling against this stock in which he has no investment, and for this privilege he is to furnish you ample storage room.

In order to protect your interests against any possible inactivity upon his part, the producer is also permitted in the contract to sell against the stock, allowing the local dealer a handling charge of about 25 per cent of his selling commission.

This plan will be agreeable to him and it establishes sufficient friendly competition to stimulate his activities. At the same time it permits you the freedom of direct contact. After this contract works along for a while and you feel that you are nicely anchored in his territory, you can change the contract to one where you turn over all of the business in that particular locality to him and sell him B. of L. attached.

This contract can be put over. It is in effect today in another business. It will enable you to distribute your stock during dull seasons, to warehouses, and relieve the congestion during the busy months.

The seeming inability to get the farmer to haul limestone except just prior to using it, is merely a problem to be mastered. With the ever-increasing number of good roads and the ever-increasing demand for limestone, the problem of marketing it simply resolves itself down to persistence, intelligent action, and action-compelling propaganda, coupled with determination and teamwork.

What the Association Has Accomplished

Reviewing briefly the work of the association and pointing out its benefits, J. C. King, chairman of the board of the association, made the following remarks at the group luncheon on Tuesday:

This group is especially interested in agricultural limestone, a product which heretofore has been considered a by-product. We now believe we are able and willing to take this product out of the infant class and place it on its own feet.

I do not believe that any of us who have

heretofore been manufacturing or producing agricultural limestone can boast of any profit we might have made from this material, but we believe that after all these years of effort the time has come when we are entitled, at least, to a small margin of profit and from now on we are going to work to that end.

The Agricultural Limestone Association has done more to take this industry out of the infant class than any other thing I can think of. We have met together on the first Thursday of every month in Cleveland and we have discussed not only our problems but the problems of others and have endeavored to interest them so that they can be interested in our association and the work that we are doing.

It isn't difficult for us to sell limestone in certain months in the year, which we call the peak months. In fact, our greatest trouble in those months is to supply the demand.

The problem that we are trying to solve now is how we are going to distribute our production over 12 months in the year, because if we depend upon the actual or the normal demand for agricultural limestone in March and April and August and September, we would starve to death. We couldn't do it. It is the dull months in the year that eat up the profits of the rich ones.

We have been manufacturing this product for a number of years and we merely ground the coarse at one time. The Pennsylvania State College of Agriculture, for the past 10 years, have been educating all the people to a fine grain, until the farmers would not buy from us that coarse product, and we were compelled to scrap valuable plants in order to produce a product that would meet that demand. We can not sell a pound of screenings in our territory and, therefore, you must understand when we take the screenings which are selling for 50 or 60 or 75 cents a ton, and rarely for more than \$1 a ton, and break that down through expensive machinery, expelling all of the moisture so that we can grind it into a powder, it costs a lot of money. The Carbon Limestone Co. at Youngstown has an investment of \$100,000 in its plant. The interest on that is considerable and we must produce a tremendous tonnage in order to break even at the end of the year.

Part of Professor Ostrander's account of the work in Indiana follows:

In Indiana we are on the agstone proposition a good part of the time. It is quite a discouraging question. The best we can do is to move perhaps 200,000 tons a year when we know that it should be 3,000,000 or 4,000,000 tons a year. We came out of the slump a year ago only one way, and that was to take a definite section and work it, not alone, but with our producers. We have never found a producer in Indiana yet that did not give any amount of time or money that it took to help put over a program, and I know that their balance sheet showed nothing at the end of the

year if they figured in the expense and the trouble they were put to, to help the county agents and the extension department of Purdue to put over their limestone program.

The first thing we must do in Indiana is to admit that Illinois, on the west of us, is selling more limestone than we are, and that Ohio counties are outstripping us on the east, and then we are going to get down and dig.

Our problem isn't so much any more the price of limestone or the freight rate on limestone or the size of limestone, as much as it is to get the farmer to realize he needs it badly enough that he will buy it. I believe it is largely backbone that is keeping more limestone off of Indiana farms than any other one thing.

If the limestone producers could get together in Indiana as they do in Ohio and agree on this and send a salesman to follow us within two or three days when we put on a limestone campaign, we would accomplish something.

The first part of January we had a meeting in Knox, Ind. We talked limestone, and if anybody needs limestone, Starke County, Indiana, does. The county agent hadn't pushed it. It happened that a limestone man came through the night before we had our short course and I asked him if he would stay over. He represented one of the Chicago limestone companies. We talked limestone and in 30 minutes' time after that meeting was over he had 14 car-loads on his order book.

I am confident there haven't been 14 car-loads of limestone go into Starke County in several months before. They knew they needed it, but they didn't get it. They knew where they could get it, because we send out a list of limestone producers in Indiana, or that can reach Indiana points, every six months, with the price.

1200 Per Cent for the Agstone User

It is true that some farmers think they haven't the money to buy limestone. As I tell them, when they want limestone as bad as they want Fords, they will get it. You don't see any Fords laid up in the garage because the price of gasoline went up a cent. It is used because they want it.

When it comes to the fineness of our product, I am between the devil and the deep sea. There is King with fine products. Here is my friend, with what we call in Indiana a coarse product. Now, we are between the two and that is about where we stand on quality of product; we lack a medium product, but our experiments are showing that we are getting good results from both. They are producing in Indiana a product that we want. We make no bones about saying every carload of limestone is worth \$1200 to the farmer; it is, before it is gone. Now, if you were making 1200 per cent on your investment, there would be some hollering done. The farmer won't even try to make it.

Sand and Gravel Producers Hold Greatest Convention

Attendants from All Sections — Secretary Hoover Makes Address—President's Plea for Research Work

AT the seventh annual meeting of the National Sand and Gravel Association held in Washington on January 24, 25, and 26, members representing companies from Florida to New York and from Texas to Minnesota gave their viewpoints on subjects pertinent to the industry, which, with few exceptions, were in harmony with each other in so far that they agreed as to the outline of activities for the ensuing year.

President Alex W. Dann opened the meeting and briefly reviewed the activities of the association since its last meeting, giving a few concrete examples of some of its accomplishments, particularly with reference to the open-top car situation. Mr. Dann stated that as proof of the assertion that the membership is appreciative of work done through the association, the Washington office can show hundreds of letters of such expressions received from members commending its work.

The question of road-side pits was discussed by Mr. Dann to some extent and he urged that some steps should be taken by the association during the coming year to make clearer to users of sand and gravel the distinction between run-of-bank material and that produced under proper specifications. The fact that there are exceptions to the rule that way-side plants produce inferior material was brought out, but the consensus of opinion during their

discussion was that such operations jeopardize the fixed industry.

In the way of a suggestion, Mr. Dann brought out that the association is in need of a promotional engineer as well as an information bureau. With an engineer much research work could be carried on and the use of high-quality materials be encouraged. He also pointed out that the association should encourage and promote cost accounting in the industry and that some specific method should be designed that would be applicable to the average company's needs.

Following his address, Mr. Dann read

for general discussion in which several took part. J. L. Shiely of St. Paul, district 19, explained that his district has established an educational bureau and that through it they are promoting the use of washed and screened material by showing its advantages over run-of-bank sand and gravel to all users and prospective users of aggregates in his section. This, he stated, is being done with literature in which is illustrated the results of concrete construction using both classes of aggregates. Mr. Shiely's talk was supplemented by A. D. Greenfield, R. C. Fletcher, E. Guy Sutton, W. L. Smith, Harry Donnelly and others. Especial attention was given to the subjects of wayside pits, educational and promotional work and cost accounting. Each of these issues was referred to a committee for future action.

In the afternoon there was a brief address by C. E. Wood of the Fresno Rock Products Co., Fresno, Calif., who is making an inspection tour of sand and gravel operation all over the country. Mr. Wood expressed his sincere appreciation of the courtesies extended him by producers everywhere he has visited, and invited all



Sec.-Treas. John Prince



President Alex. W. Dann

Treasurer Prince's financial statement and also a letter from him expressing his regrets in being unable to attend the meeting. Mr. Prince's report was unusually gratifying in that it showed the financial condition of the organization to be the best in its history and that with all bills paid to date, there still remains a creditable balance on hand. At the end of this report, the report of Secretary Barrows was given out.

At this time the meeting was opened



Vice-President E. Guy Sutton

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members and non-members to visit his company's plants in California.

Edwin Brooker, traffic and transportation expert and statistician, explained "Kelly's 228" tariff and made clear to all how and when it is applicable. As to the open-top car shortage he advised that it would be good policy for members to act individually in the event of another crisis, in addition to the efforts of state and national organizations.

Herbert Hoover Speaks

Following the general discussion, the association was addressed by the Hon. Herbert Hoover. Mr. Hoover opened his address by saying that the United States is enjoying one of the most prosperous eras in its history and that during the past year it has recovered from one of the biggest business depressions and commodity shortages ever known. As a result of the recovery, unemployment does not exist. He pointed out that this condition as compared to that in other countries is well worthy of commendation. Mr. Hoover assured the association that the Department of Commerce has strived to co-operate with trade associations and that it has sought to develop in every way possible the work of such associations.

At the end of his address he was, by invitation, showered with questions. Chief among these were: "What are your views on the transportation situation?"; "What about the consolidation of railroads?"; "What are your views on car distribution?"

In answer to the question of transportation, he replied that the development of transportation has fallen down and has not kept pace with the increased growth of commerce and business activities in general, and that the greatest lack of development has been in motive power and terminals, rather than in cars. This condition, he explained, has been brought about chiefly because the railroads cannot afford to borrow money at 5 and 6 per cent when their average earning rate is but 4.2 per cent; that the only remedy of the situation is the consolidation of the railroads. By a consolidation the small, weak roads could be absorbed and the source of trouble removed. Many roads are now ready for a consolidation but are waiting for the proper legislation to be brought about.

In addition to the development phase of transportation, Mr. Hoover stated that some measure should be taken to relieve it of the complex rate system now existing, and that, in his opinion, the only way is to regulate rates by law. This, he explained, could be done and still permit the maintenance of rate competition, but that they should be adjusted on a basis of the known declared value of 5½ per cent.

In answer to the car distribution and the coal priorities queries, he replied that there is but one way for rock products industries to get relief and that is *to have no priorities*.

Mr. Hoover explained further, however, that due to the seasonal fluctuation in the coal demand, the railroads could help the situation by moving their own supply during the light season. Thus, one-third of the coal used annually in this country would be handled prior to the peak season so that the roads could concentrate on moving it for other purposes during the heaviest demand season.

Mr. Hoover concluded by stating that he hopes and believes priorities will never again be necessary and that his department is ready at all times to co-operate with the association in every way possible.

Second Day's Session

The second day's meeting was opened by an address by J. H. De Groot, of the Service Bureau of the Interstate Commerce Commission. Mr. De Groot made an optimistic prediction for the coming year. "While the lack of motive power is our biggest transportation difficulty," said he, "it is being rapidly overcome."

Dr. George E. Ladd, of the Bureau of Public Roads, assured the association of the co-operation of his department. He also suggested that it adopt a definite cost system.

Several films of road construction were put on the screen. The J. L. Shiel Co., St. Paul, Minn., showed a film of the company's plants in which were included several examples of good advertising and promotion of the use of sand and gravel.

There were also addresses by John G. Cooper, member of Congress, and Judge Nathan B. Williams. Mr. Cooper expressed himself as in opposition to the Railway Labor Board, claiming that it causes most of the railways' trouble. He also explained his bill to abolish the board. Judge Williams declared that he believed a legislation machine is running affairs in Washington today. He claims that there are too many laws and too many taxes. A general discussion followed on cost accounting, educational work, and new uses for sand and gravel.

The address of C. C. Griggs, of the Bureau of Internal Revenue, will be published in full in ROCK PRODUCTS for February 10. The directors also formulated a program and a budget for the ensuing year.

Report of Executive Secretary Barrows

In taking account of National Association activities during 1922, first attention is naturally given to the factor which interfered most seriously with the progress of the sand, gravel and stone industry during that year—shortage of cars.

It was our policy, from the very outset of the shipping season, to develop and maintain the closest contact with the Car Service Division of the Interstate Commerce Commission and the American Railway Association. Early in March, members were advised that the later summer and autumn months would witness a restriction in car supply, even though the I. C. C. did not exercise its prerogative of issuing priority orders. Emphasis was

repeatedly laid, through the Bulletin, on moving materials while the open-top car surplus was large and when coal would not be moving due to the cessation of coal mining because of the strike.

In addition, in the early month of 1922 the car situation was brought to the attention of the Bureau of Public Roads, and suggestions were made that the time was opportune for instituting measures designed to get road materials on the job while an ample supply of cars was to be had. Acting upon these representations, the Bureau sent a letter to all state highway commissions, laying stress on the importance of providing for maximum deliveries of materials.

On July 26, 1922, the I. C. C. issued Service Orders 22 and 23. The effect of the former was immaterial, it merely providing for the routing of freight traffic by the most expeditious route, regardless of shipping instructions. Service Order 23 applied east of the Mississippi and instructed the railroads to give preference to the movement of certain traffic, including coal. The immediate effect of this order was not to deny cars to the sand, gravel and stone industry, except in territory adjacent to the non-union coal fields. Producers in this territory, however, were immediately handicapped with the most stringent regulations and were practically compelled to shut down their plants. Of course, at that time the strike in the union fields had not been settled and the primary purpose of the commission in issuing Service Order 23 was to realize on the potential capacity of 6,500,000 tons weekly which the non-union mines are capable of producing.

Promptly upon the issuance of the service orders, members were furnished with a digest of the provisions, together with a statement of the various steps which had been taken to protect the interests of the industry. Members were requested to bring their car shortage complaints to the attention of the Washington office for handling with the various agencies. As was anticipated, misinterpretation of the service orders by the railroads was the first obstacle to be met, as such misinterpretations were causing severe financial losses to our industry. The matter was taken up with the American Railway Association, and on August 5 the chairman of the Car Service Division of that association issued a circular letter to the carriers, specifically pointing out that Service Order 23 did not operate to prohibit the loading and movement of commodities other than coal in open-top equipment.

Upon the resumption of coal mining in the union fields, the number of cars available for loading sand, gravel and stone was still further restricted and the full effect of the drastic provisions of the order were felt by all producers east of the Mississippi river. Through negotiations with the I. C. C., the American Railway Association, and the individual railroads direct in many instances, the Washington office was successful in securing cars for a large number of members who had been denied cars by the lines serving their plants. In addition to this activity, a constructive program was formulated for modification of the service orders, which included permission to load open-top cars with sand, gravel and stone when moving empty in the direction of the mines, together with authority to load cars with sides 42 in. and less in height instead of the 36-in. restriction which was incorporated in Service Order 23.

In the meantime, the I. C. C. issued Service Order 24, effective west of the Mississippi river, which provided that to the extent any carried in that territory was "currently unable promptly to transport all freight offered to it for movement," it should give preference and priority to the movement of certain commodities, including coal.

At a conference with the I. C. C. on September 1, we were informed that, effective September 3, Service Order 23 would be modified so as to permit the use of all cars with sides of 42 in. and less for sand, gravel and stone loading. This amendment placed 34,000 more cars at our disposal.

Association Petitions the I. C. C.

On September 1, the National Association presented a petition to the I. C. C. asking for the opportunity of appearing formally before the commission to present its reasons for requesting the following modifications in Service Orders 23 and 24:

1. After essential coal requirements, such as are covered by Classes 1 and 2 of Amendment No. 4 to Service Order 23, have been taken care of, available open-top cars be distributed on an equal basis to all shippers requiring such cars for transportation of their materials. Also that no priority be given in the transportation of coal for non-essential uses in the territory covered by Service Order 24.

2. That coal cars may be used in transporting sand, gravel and stone in the direction of the mine or mines to be supplied, on the return movement, after the discharge of the coal lading thereof, upon a route not materially out of line and to points not beyond such mine or mines.

3. That provision be made that an embargo be placed against any consignee using such coal cars who fails to unload the same within 24 hours after placement.

On September 8 the I. C. C. announced that on September 21 it would hear the complaint of the National Association as to the priority orders, at which opportunity would be offered for supporting our plea for changes in the orders as then constituted.

A preliminary meeting was held in Washington on September 20 to map out a program of presentation of evidence before the I. C. C. on the following day. On the same day the Commission issued Service Order 25, granting in full two of the requests which the association made in its original petition. On account of this fact, it was necessary to somewhat rearrange the previous plans and, therefore, at the hearing before the Commission on September 21, President Dann made additional requests for modification of the priority orders as follows: Abolishment of the reconsignment privilege on commodities loaded in open-top cars, including coal, during the existence of the priority orders, except upon the direct authority of the Commission in each particular case; the inauguration by the Commission of effective steps to prevent the accumulation of either empty or loaded open-top cars at points of origin or at destinations.

The provision embodied in Service Order 25, permitting the loading of sand, gravel and stone in open-top cars when such cars were moving empty in the direction of the mines, conferred instant benefits upon the industry. In a large number of cases, members were able to use this provision as a means of securing a completely satisfactory car supply, while, unfortunately, there were others who, having no business which could be construed as moving in the direction of the mines, were not able to derive any benefits from this concession of the Commission. However, as a general proposition, this change in the original order was what might be termed a "life-saver." Realizing from the beginning the great advantages to be de-

rived from authority to move our materials in the direction of the mines, the National Association concentrated its efforts on securing that concession. The Commission was obdurate at first and steadfastly announced that under no circumstances would it incorporate such a provision in the priority orders. However, the constant reminders which we placed before them of the harmful effects which the priority orders were having on our industry, and the indisputable evidence presented to them to the effect that loading coal cars with our materials in the direction of the mines would not retard the production and distribution of coal, had their effect.

After submitting our requests as previously mentioned,* President Dann called on members representing different sections of the country to relate to the Commission the critical situation in the various localities due to the priority orders. At the conclusion of the hearing, Commission Aitchison stated that our case would be taken under advisement.

Considerable difficulty was experienced by members with plants west of the Mississippi, because of the apparently deliberate misinterpretation of the service orders by some of the carriers in that territory. This was strikingly illustrated in one case where a railroad company gave Service Order 25 as its justification for cutting off the service of a member with a plant in Oklahoma. The case, upon being reported to the Washington office, was handled directly with the carrier and attention called to the fact that Service Order 25 had no application west of the Mississippi. We were successful in securing an acknowledgement from the carrier concerned that it was not authorized to restrict sand, gravel and stone service under Service Order 25, and the situation was speedily remedied.

Several other members in the Western territory suffered most unnecessary and severe car supply difficulties during the period of the priority orders. One carrier, in this territory, acting upon our request to increase the car supply of our members with plants on its lines, assigned 500 system ballast cars for commercial sand, gravel and stone use.

As another step in the general program President Dann, accompanied by the Executive Committee and the Executive Secretary had a conference with Commissioner Aitchison on October 21, at which an appeal was made for cancellation of the orders. The attention of the Commissioner was directed to the apparent coal surplus and to other features of the coal situation, such as vast quantities of unbilled coal on the mine siding and on the rails of the carriers. On November 20 the Commission practically cancelled the priority orders in the Southern territory, and on November 23 it issued an amendment to Service Order 25, permitting the use of cars with sides 48 in. and less in height.

On December 8 the Commission issued orders cancelling the priority orders in all territories.

A question which naturally presents itself at this time is: What can the sand, gravel and stone industry expect in the way of adequate car supply during 1923? Of course, if through the efforts of the newly created U. S. Coal Commission, a strike in the bituminous fields is averted on April 1, the most fruitful cause of the priority orders will be removed, which would mean that the autumn and early winter months will not witness a mad rush to move coal, regardless of where

it is going or what necessary industry is put out of business.

But quite aside from the effect of strikes and priority orders, it must be considered that our railroad facilities are not capable of taking care of "peak-load" traffic, which generally comes during September and October. There is in prospect during 1923 the largest construction program ever contemplated by this country. A heavy activity in the building industry will, beyond a doubt, be accompanied by general prosperity in every line of business endeavor.

Another Shortage in 1923?

If the present indications as to business activity during 1923 are borne out, the country may be confronted with a serious shortage of transportation facilities, and if the industrial revival is a real one, the shortage and the resulting congestion are quite likely to be the most severe and harmful in the country's history. The capacity of the railroads for handling commercial traffic with reasonable expedition was reached and passed in 1915. It is commonly accepted that railroad traffic doubles about once every 10 or 12 years, and also that the traffic handling capacity of the railroads has not been measurably increased since 1915—on some lines it has been greatly diminished.

All these factors combine to illustrate the advisability of maximum movement of our materials during the spring and early summer months. Members can help to bring this about by placing the full facts before their customers, emphasizing the importance of getting materials on the jobs while transportation facilities are to be had. Each member should conduct his own educational campaign, thus supplementing the general program which the National Association has for encouraging the early movement of materials.

It is also well to remind members of the necessity of making written requests of their local agent or local car distributor for the number of cars they require for loading. Only in this way will the figures of the American Railway Association as to car supply for our industry truly reflect the actual situation.

As to Freight Rates

On January 11, 1923, the I. C. C. made public its decision in the Central States case, in which it dismissed our complaint. That decision is so completely at variance with the facts presented and with the unanswerable arguments offered, that it is quite difficult to follow the line of reasoning of the commission in so sweepingly denying our allegations.

As a direct result of the National Association's vigorous prosecution of an application for changing the minimum loading to 90 per cent of the marked capacity of the car, instead of the marked capacity, the Trunk Line Association, on June 11, approved the application.

One member in Trunk Line Association territory, in writing that he had been compelled to refund \$49 to one customer alone before the National Association's application had been approved, said: "The granting of this application means the return of all my dues to the National Association and then some. I consider this a most valuable and definite service and I fully appreciate it."

Another problem which is deserving of most serious consideration at this time is that of the proposal of the carriers to cancel the rule for constructing combination rates, as published in Tariff 228. Supple-

Rock Products

January 27, 1923

ment 14 to this tariff, issued in November, 1922, states that the carriers plan to cancel the tariff on March 1, 1923.

At conference of the National Association with George Crosland, Chief, Section of Tariffs of the I. C. C., the latter stated that the commission had given the carriers permission to cancel the rule, provided they furnished the shipping public with ample notice of their intention to do so, and provided further that the railroads, upon requests from shippers, established a line of through rates or proportional rates which would continue in effect the present basis. Mr. Crosland stated that the commission was agreeable to the cancellation of the rule because it was very difficult of application in a great number of instances, was frequently misinterpreted, and therefore, led to much litigation.

The carriers were given to understand by the commission that the cancellation of the combination rule was not to be used as a means of increasing rates. Members can ascertain from their records where shipments are now moving on a combination of local rates under the application of the combination rule, and it is important that they immediately request the railroads serving their plants to publish through rates on the present basis, or to establish proportional rates to and from junction points which will continue in effect existing rates under the use of the combination rule.

Occasion is taken in this report to impress upon members the importance of taking prompt steps to protect themselves against the cancellation of the combination rule named in Tariff 228, for otherwise it will mean an increase in rates of 30 cents per ton in instances where a combination of local rates are now used.

National Legislative Activities

The chief legislative activities have been toward stimulating interest in the passage of Senate Bill 690, which was introduced by Senator Calder, of New York, at the request of the National Association, and which would so amend the Transportation act of 1920 as to remove from the I. C. C. the power of declaring "emergencies" and issuing priority orders.

The bill was referred to the Senate Committee on Interstate Commerce for consideration and report. On March 10, 1922, the I. C. C. addressed a letter to Chairman Cummins protesting against enactment of the bill and citing its reasons for recommending rejection of the measure. Through the courtesy of Senator Cummins, the National Association was privileged to answer the objections of the Commission, and, on March 29, President Dann forwarded a communication to the Senate Committee, which set forth in detail the harmful effects of priority orders, together with indisputable evidence that the retention of this power by the Commission is a constant menace to legitimate industry.

On April 25, President Dann formally appeared before the Senate Committee on Interstate Commerce and recommended favorable action on Senate Bill 690. A statement, supported by statistics gathered from all parts of the country, indicating loss of business to our producers following the priority orders of 1920 was read into the record, and President Dann drew the committee's attention to the importance of a fair and reasonable car supply for the sand, gravel and stone industry if the construction program of the country is to be carried forward to a conclusion.

Shortly after the hearing Senator Cummins publicly stated that no consideration would be given to proposed changes in the

Transportation act during the present Congress, which does not expire until March 3, 1923. At that time, it will be necessary to reintroduce the bill to remove the priority powers of the Commission. After a careful survey of the situation, it is the recommendation of the Executive Secretary that the bill be introduced in the House of Representatives, where it is more likely to receive the consideration to which it is entitled. During the next Congress, the Senate Committee on Interstate Commerce will be completely absorbed in legislation involving the repeal of the so-called "guaranty clause," and the restoration of state control over state rates, and it will undoubtedly be difficult to secure consideration by the committee of legislation along any other lines.

The salvation of our industry lies in the enactment of a bill to remove the priority powers of the Commission. Until such a measure is passed, we must ever operate on a hand-to-mouth basis, with the constant fear that the I. C. C. may see fit any day to exercise its despotic power of wrecking our business, without affording us any advance warning, without being compelled to present reasons for their arbitrary action, and visiting irrevocable financial losses on the members of the sand, gravel and stone industry.

Another legislative proposal of interest to the industry is House Joint Resolution 314, introduced on April 28, 1922, by Congressman Greene, of Iowa, which provides for an amendment to the Constitution which will deprive states and municipalities of the power of issuing tax-exempt bonds for public improvements. The resolution has been favorably reported out of the Ways and Means Committee of the House, but it seems to have met with considerable opposition on the floor, and it seems improbable that it will be called up for a vote during the remainder of this session of Congress.

If the proposed Constitutional amendment passed both houses of Congress and received the ratification of three-fourths of the states, it would, in all probability, have a discouraging effect on road-building. However, the chances for its passage appear very remote at this time, even though it seems to have the support of Administration leaders.

The National has established connections which enable it to furnish members special information promptly concerning measures introduced in Congress which have a direct or indirect effect on the sand, gravel and stone industry. During the past year there has been started a special section in the Bulletin which discusses the general legislative situation and which also gives a detailed analysis of all bills in which the industry has an interest.

Contact with Government Departments

The National is officially recognized before all departments of the government, and its co-operation is sought in all investigations concerning the industry it represents. Perhaps to cite an instance of our co-operation with the Division of Building and Housing of the Department of Commerce would be sufficient to indicate the general scope of our activities along this line. This division publishes at regular intervals statistics which purport to give the delivered price of various building materials, including sand, gravel and stone. Examination of these statistics covering one particular market showed the quotation of a price which seemed to be much higher than actually prevailed, whereupon the National instituted an investigation, which brought

out that the division was quoting, in some instances, delivered prices of our materials as plant prices, which, of course, was not a true reflection of the actual situation and showed up to the serious disadvantage of the industry.

When the matter was brought to the attention of the Division it was immediately corrected, and the National was formally requested by John M. Gries, chief of the Division, to assist in securing accurate figures as to the selling prices of sand, gravel and stone. This was done, and very satisfactory results have been achieved.

The National has maintained its cordial relationship with the Bureau of Public Roads and has worked in conjunction with that Bureau on several matters.

The National has also kept in touch with the work of the Geological Survey, the Bureau of Standards, the Bureau of Labor Statistics, and the Department of Commerce, and the membership has been promptly informed of all activities of these governmental agencies which concern the industry.

Income Tax Matters

The Association has been able, upon several occasions during the past year, to render distinct benefits to members in connection with depletion and depreciation cases before the Bureau of Internal Revenue. The Executive Secretary, upon securing power of attorney, is in a position to represent members before the Bureau in connection with their income tax cases. Many members have been informed as to their rights and privileges under the income tax laws and, through conducting preliminary negotiations with the Bureau and otherwise, the Association, it is safe to say, has been enabled to save money for a great number of members.

Cost Accounting

The production of sand, gravel and stone is essentially a manufacturing business. A uniform cost system will give the manufacturer comparable results. That is to say, it will afford him assurance that other manufacturers in his line have included the same items of cost, that their enterprises have been substantially departmentalized in the same way as his own, that there exists a common treatment of overhead, a tying up of the financial and cost records. In other words, when the producer studies his summary of manufacturing cost, he should be able to feel that other producers are figuring their costs in the same way that he is, and that any differences in cost which may exist are based on superior efficiency and not because of cost ignorance.

The Association has undertaken through the Bulletin, to educate the industry as to the vital need of establishing a uniform cost accounting system which will comprehend every item of cost entering into sand, gravel and stone operations. In addition, it has supplied various members, upon request, with an outline of a system which has been of much assistance.

The Bulletin Supplement

During the past year, the weekly Bulletin Supplement was adopted as a service to members only. Its main purpose is to keep the membership accurately and promptly informed as to all matters affecting the industry. It correctly analyzed the priority orders and instructed members as to their rights under the orders, a service rendered by no other national organization within our observation. The Bulletin Supplement also supplied the membership with confidential information along other lines. Its value is

attested by the expressions of approval which have come from many sources, and we are encouraged to believe the membership has come to recognize the Bulletin Supplement as one of the chief features of affiliation with the Association. Therefore, it will be continued permanently.

Growing Menace of the Wayside Pit

One of the most serious evils confronting the established industry today is the wayside pit. The Association, through the Bulletin, has directed a continuous and unqualified campaign against the use of unsuitable and unprepared materials secured from temporary deposits. The Association has found, in some instances, that there is a surprising lack of appreciation of the importance of preparing our materials for building purposes.

The Association, representing the responsible producers of materials, with established plants and a business reputation to sustain, will carry forward and expand the work it has already begun for discouraging the use of inferior materials. Several of the local associations, notably the Ohio Association, of which Guy C. Baker is executive secretary, and members of District No. 19, are carrying on a vigorous campaign of education as to the inevitable results of the use of wayside materials. A similar campaign should be instituted by producers in all parts of the country, such campaigns to be supplemented by the general program of the Association.

The Constitutional Convention

On July 21 and 22, 1922, the Reorganization Committee, appointed by President Dann with the approval of the Executive Committee, met in Chicago to formulate recommendations as to changes in the plan of organization of the National Association.

The Reorganization Committee drew up a new constitution and by-laws for the Association suggested the dividing of the country into 26 districts for the purpose of better suiting the needs of members, and submitted to the Executive Committee a list of recommendations as to activities of the Association, the latter being approved and carried into effect.

On November 15, 1922, a special convention of the Association was held in Chicago for the purpose of accepting or rejecting the suggested amendments in the constitution and by-laws of the Association. A thoroughly representative attendance was had, and, after a full discussion of the proposed changes as prepared by the Reorganization Committee, they were unanimously agreed to.

The new constitution and by-laws reflect a more democratic spirit of national organization and will make this Association of still greater worth to its members.

Finances

In the report of our Treasurer, John Prince, will be found more detailed information as to the state of the finances of the Association. It might be well thought to point out here the gratifying reduction of the outstanding debts as indicated by that report. Every item of expense has been carefully watched and substantial reduction have been effected. In reporting on the question of reduction in expenses, I want to emphasize that such savings as have been effected were accomplished without impairment of the efficiency of the organization and without the neglect of a single activity which could be engaged in for the benefit of members.

The Bulletin and Its Offspring

The National Sand and Gravel Bulletin, owned, edited and published by this Association, is found an effective publicity medium for this industry.

The Bulletin goes to every commercial sand and gravel producer in the country, to many crushed stone producers, to all state highway engineers, to heads of government departments. Unsolicited letters indicate that it is read and considered. Its publication entails no expense upon the Association. There is a tremendously wide field for its expansion, for greatly increasing its influence.

The new constitution provides for an annual subscription of \$2 to the Bulletin. This is not an added charge in any way. It is designed to permit the Bulletin to secure second-class mailing privileges, in accordance with the post office regulations.

The average monthly circulation of the Bulletin during the past year has been about 2,000 copies. It might well be 4,000. This, however, would mean the creation of an entirely new department, additional clerical help and office space. Without doubt, the time is approaching when this may be done.

The Supplement is a child of the Bulletin and goes only to members. It is now an established activity of the Washington office and all the work in connection therewith is done there.

Recognition, Achievement, Growth

Perhaps it may be well to quote here from the program of this seventh annual meeting, wherein it is stated:

Recognition: The world-famous names appearing on this program is sufficient evidence of the national recognition now accorded this Association of business men and the basic industry it represents. This recognition, as herein expressed, would not have been extended had it not been earned.

Achievement: Pride of accomplishment is a very great and impelling force in business life. The achievements of this Association during the past year have been definite, have been of enormous value to the individual members and to this entire industry. The records of the Washington office comprise the quite indisputable evidence as to this.

Growth: Based on the national recognition now accorded this Association, and the industry it represents, and on this Association's definite achievements during the past year, the steady and conservative growth of the National Sand and Gravel Association is assured—is already in evidence.

And Finally, Brethren

The year 1922 has fully demonstrated the need of maintaining a strong, active and virile Association at Washington. Every national industry of importance is organized in a body which speaks for that industry on matters of interest to it.

Our industry had its share of misfortunes during the past year. But it would have received scant consideration by the authorities had not the National Association been on the ground to assert its rights and to insist on more equitable treatment for its industry. Past experiences have shown that the burdens are shunted off on those who protest the least, and unless the industry is enabled to speak as one voice through the National it will inevitably be discriminated against by all agencies.

The National belongs to the membership. Its value will be measured by the active support which it is accorded by those in the industry. Its possibilities are unlimited, its need is demonstrated, and its future is assured.

At the conclusion of Secretary Hoover's address the following were elected for the ensuing year:

President, Alex W. Dann, Keystone Sand and Supply Co., Pittsburgh; vice-president, E. Guy

Sutton, Carmichael Gravel Co., Danville, Ill.; secretary-treasurer, John Prince, Stewart Sand Co., Kansas City, Mo.; directors at large, Harry Donnelly, Ohio Gravel Ballast Co., Cincinnati; V. O. Johnson, Lincoln Sand and Gravel Co., Lincoln, Ill., and J. E. Carroll, J. E. Carroll Sand Co., Buffalo, N. Y. Executive committee: W. L. Smith, Tennessee; Hugh Haddow, New Jersey; George C. Rose, West Virginia; R. C. Fletcher, Iowa.

The Registration

David Alexander, Petersburg Sand and Gravel Corp., Petersburg, Va.; S. Ralph Andrews, Charlestown Sand and Stone Corp., Elkhorn, Md.; Charles P. Biesanz, Winona, Minn.; J. B. Blanton, J. B. Blanton Co., Frankfort, Ky.; E. P. Brear, Newman Sand and Supply Co., York, Pa.; M. A. Callahan, Cleveland; J. P. Cantlon, Neal Gravel Co., Mattoon, Ill.; J. E. Carroll, J. E. Carroll Sand Co., Buffalo; W. S. Carson, West Branch Sand Co., Du Bois, Pa.; J. M. Chandler, Price Sand Co., Tulsa, Okla.; W. H. Collins, Spruce Pine Sand Co., Spruce Pine, Ala.; C. C. Coelius, Jr., Hampton Roads Sand and Gravel Corp., Norfolk, Va.

Alex W. Dann, Keystone Sand and Supply Co., Pittsburgh; C. S. Diggs, Charlestown Sand and Stone Corp., Elkhorn, Md.; Harry Donnelly, Ohio Gravel Ballast Co., Cincinnati.

L. B. Fitch, Continental Products Corp., Rochester; R. C. Fletcher, Flint Crushed Gravel Co., Des Moines; John W. Fox, Hampton Roads Sand and Gravel Corp., Norfolk, Va.

J. P. Gallagher, H. D. Conkey & Co., Mendota, Ill.; R. E. Garrett, Charlestown Sand and Stone Co., Elkton, Md.; A. D. Greenfield, Chehaw Sand Gravel Mfg. Co., Atlanta; James H. Griffith, Wolf River Sand Co., Memphis.

Hugh Haddow, Jr., Menantico Sand and Gravel Co., Millville, N. J.; Louis F. Hart, Wabash Sand and Gravel Co., Terre Haute.

V. O. Johnston, Lincoln Sand and Gravel Co., Lincoln, Ill.; W. E. Johnson, Missouri Valley Association of Sand and Gravel Producers.

E. C. Linnix, John Wunder, Minneapolis.

Milton McDermott, Knoxville Sand and Lime Co., Knoxville; Joseph R. McGaw, Ohio River Sand Co., Pittsburgh; A. J. McKenzie, McKenzie Construction Co., San Antonio; Thos. McCroskey, American Limestone Co., Knoxville; W. H. Merrill, West Virginia Sand and Gravel Co., Charleston.

H. V. Owens, Boomville Sand Corp., Utica.

F. W. Peck, Muncie Sand Co., Kansas City, Mo.

W. E. Rogers, Arkansas River Sand Co., Tulsa, Okla.; G. C. Ross, Ohio River Gravel Co., Parkersburg, W. Va.; Chas. L. Ruffin, Massillon Sand and Gravel Corp., Fredericksburg, Va.

H. E. Schellberg, Lyman Richay Sand Co., Omaha, Neb.; J. M. Settle, Ohio River Sand Co., Louisville; J. L. Shiely, J. L. Shiely Co., St. Paul; W. L. Smith, Memphis Stone and Gravel Co., Memphis, Tenn.; H. B. Springer, Dixie Sand and Gravel Corp., Chattanooga; H. J. Stanner, H. J. Stanner Sand Co., Northumberland, Pa.; E. Guy Sutton, Carmichael Gravel Co., Danville, Ill.

C. E. Todd, Kaw River Sand Co., Kansas City, J. B. Valkenburgh, Huntsville Trans. and Bldg. Material Co., Huntsville, Ala.

J. H. Wagener, Bonville Sand Corp., Bonville, N. Y.; T. J. Weston, Weston & Brooker Co., Columbia, S. C.; H. H. Witmer, J. C. Budding Co., Lancaster, Pa.; John Wunder, John Wunder Co., Minneapolis.

The ladies present were as follows:

Mrs. David Alexander, Mrs. Charles P. Biesanz, Mrs. J. E. Carroll, Mrs. Norman F. Callahan, Mrs. Rose Collins, Mrs. J. N. Chandler, Mrs. R. C. Fletcher, Mrs. F. W. Peck, Mrs. W. A. Rogers, Mrs. H. E. Schellberg, Mrs. J. L. Shiely.

The guests were as follows:

C. B. Andrews, Taylor-Wharton Iron and Steel Co., High Bridge, N. J.; T. Antissel, valuation engineer, Washington; E. F. Ayres, "American Contractor," Chicago.

C. E. Banta, Broderick & Bascom Rope Co., St. Louis; R. J. Borwick, valuation engineer, Washington; C. A. Burdick, valuation engineer, Washington; C. A. Breskin, "Rock Products," Chicago; Edwin Brooker, traffic expert, Washington.

E. H. Causey, "Pit and Quarry," Washington; S. E. Cole, "Pit and Quarry," New York.

A. T. Davis, Morgan Engineering Co., Alliance, Ohio; G. N. Dulin, Leesburg, Va.

G. M. Earnshaw, "Rock Products," Chicago.

J. J. Fitzgerald, "Pit and Quarry," Baltimore.

D. J. Hauer, "Pit and Quarry," Baltimore.

B. D. Pierce, Jr., Connecticut Quarries Co., New Haven.

N. C. Rockwood, "Rock Products," Chicago.

A. P. Sanders, National Crushed Stone Association, Columbus; F. W. Schmidt, North Jersey Quarries Co., Morristown; S. L. Shonts, valuation engineer, Washington.

Nathan B. Williams, National Manufacturers' Association, Washington; C. E. Wood, Fresno Rock Products Co., Fresno, Calif.

Quarried from Life

By Liman Sandrock

A Hole, a Blast, and—

BANG! An explosive beginning? Yea, verily, and properly, for our tale concerns a veteran powder man and an equally veteran driller.

You do not need to ask who they are. One glance at our grouping of these two buddies in the picture at once informs you that S. R. Russell of the DuPont company and J. L. Rose of the Sanderson Cyclone company are held up to your view.

Literally, thousands in our industry have met these men—have great respect for their abilities and experience—a keen pleasure in knowing them.

Your veracious historian sidled in between them one morning at the Crushed Stone convention, and managed to pry them loose from a few facts concerning their past. We got what we wanted mainly by making S. R. tell what he knew about Jake—and *vice versa*.

We asked S. R. where he was born.

"Oh, that's a long time ago," says he.

"Raised?"

"In a neck of the woods up York state way." And then came the well-known hiatus that continued up to the time he was graduated from the Rensselaer Polytechnic Institute as a civil engineer.

"Well, brother, what you been doin' since then?" we urge.

"Oh, trying to justify it." You'd not have believed the loud and embarrassed silence that ensued if you'd heard it. Then—

"I became identified with the DuPont company in 1907—and—and—I'm still on the payroll. I'm at your service on call."

Mr. Russell, we'll tell the world, bulks large in our industry, and has for years. What he knows about the relation of explosives to the economical operation of stone quarries; about high explosives and modern methods of firing—would fill a book. He is quoted as an authority in the Bureau of Mines literature; he has written much. Now go back and reread what he has to tell about himself!

However, we did manage to blast out a whole mountainside of things about Jacob L. Rose. He was born in Ellet county, in ol' Kaintuck', on August 12, 1883. His parents died when he was six years old, and as Jake says, he brought himself up in that Kentucky mountain atmosphere where have been raised giants physical and mental.

In due time he qualified as a mule-skinner, and gained a reputation all over his section

as one of the best. Later, he forsook the mule for underground work, getting a job with the old Cyclone folks as a core driller. He worked at it for five years.

About that time big blast hole drilling was in its infancy, but though it was a blame-sight harder than mule-skinning, Jake stuck. By hard work and patience he has earned a reputation from coast to coast and all over Canada wherever rock is drilled and blasted. He was a service man for more than 17 years.

Three years ago the Sanderson people forced Jake to take up the selling end. "And



Jacob L. Rose, of the Sanderson Cyclone Drill Co., and S. R. Russell, of the DuPont Powder Co.

in this," says he, "I had more damned grief than in anything else."

He has never lost the feel of the overalls, however, for "Today, I have to go out and drill before some of my prospects get the right brand of confidence in me." It's action and performance that count.

Limestone, sandstone, granite, trap and quartzite all look alike to Jake.

"Following the quarrymen in a heluva life, Lyman, ol' top. I live in a grip. When I leave this convention I'm hotfootin' it up into the Hudson Bay district—and from there I'll not be surprised if the following week I'm skyhootin' for Florida."

"Do you ever slip?" we ask, having in mind the many dangers attendant upon the work of the driller in hard rock. High ground, steep cliffs, loomed large in our imagination, and we could vision Jake hanging by his trusty overalls over chasms,

abysses, and jagged peaks. He looked at us almost disgustedly.

"Slip? I've slipped off a 20-foot cliff on more than one occasion. One time I just came near ruining a perfectly good pair of gloves!"

To see S. R. and Jake hobnobbing around at a convention you'd take them for a couple of mild-mannered owners of a down-state quarry, with ears cocked for a new kink to cut down operation costs. But—they've done things in their time, and many of us know it. Let us wish them years and years more of the same kind of accomplishment!

Wanted: An Answer

TRUE, we have a "Q. and A." department, but we cannot believe that it is sufficient excuse for a limestone producer to send us the following with the expectation that it will be answered to his satisfaction in that department. What do you make of it?

Where can a man buy a cap for his knee?

Or a key to the lock of his hair?

Can his eyes be called an academy,

Because there are pupils there?

In the crown of his head, what gems are found?

Who travels the bridge of his nose?

Can he use, when shingling the roof of his house,

The nails on the end of his toes?

Can the crook of his elbow be sent to jail?

If so, what did he do?

How does he sharpen his shoulder blades?

I'll be hanged if I know, do you?

Can he sit in the shade of the palm of his hand?

Or beat on the drum of his ear?

Does the calf of his leg eat the corn of his toe?

If so, why not grow corn on the ear?

They Said It

AT ZAWIERCIE, Poland, a cement plant is projected, to be equipped with American machinery. The address is Towarzystwo Akcyjne Przemyslu Cementowego "Wick" Skrzynka Pocztowa No. 3. If we could get a bit more light from that "wick," this information would be more illuminating.

NOT HARD to get money out of Fond du Lac gravel pits. Scores of coins have been dug up by laborers recently. About 1825 there was an Indian trading post near that city.

"SHALL Moses or Darwin rule Minnesota schools?" asks the *Literary Digest*.—Darwin? Thereby hangs a tail. Moses? Here's where the bull rushes—with Minnesota on the horns of the dilemma.

Rye is to be the medium of exchange in Oldenburg, Germany. Rye notes are to be issued based upon the value of rye and will be worth a certain quantity of rye.—Exchange.

Can you "roll your own," having in mind the requirements of the Eighteenth Amendment?

"YOU SHOULD SEE my hens," said an Ohio producer during the Crushed Stone convention. "They are Klymouth Kocks. 'K' is the kween klucker of her klan. Say! when Ku klucks—"

Editorial Comment

Quarry men from every part of the United States—from California to South Carolina; from Canada to the Gulf—attended the recent annual convention in Chicago of the National Crushed Stone Association. Apparently all went away feeling amply repaid for their time and trouble. And there was a reason. It was educational. There was a good fellowship. There was a realization of the community of interest. There was a realization that many problems are common to all; that all are seeking the same solutions. How better can such problems be solved than by an exchange of experience, of ideas, of thought?

Perhaps the most important achievement of this convention was the reorganization of the National Crushed Stone Association on the basis of individual memberships at \$25 per year. It is a step toward democracy. It opens the doors to many producers who have not been interested before. It paves the way for an association that will embrace the whole quarry industry.

There are many problems for the quarry industry to solve. There is much to be done in finding out quarry costs and why. There is much to be learned about labor-saving equipment. There is much to be learned about reducing accidents, thus saving the present high cost of workmen's compensation insurance. There is a vast amount of information to be gathered and digested about so common a material as rock.

Now, however, the quarry industry has the organization to pursue these objectives. It has an organization that deserves the support of every quarry operator, whether his product is crushed stone or a more complicated manufactured product.

May the 1923 convention of the quarry industry be but the beginning of many conventions which must eventually bring this industry the recognition it has long deserved as a *basic non-metallic mining industry*.

Dolomite is a little known mineral. It is a combination of magnesium carbonate and calcium carbonate.

Possibilities of Dolomite “Burning” calcium carbonate makes lime. “Burning” magnesium carbonate makes magnesia. The properties and uses of lime are fairly well known. Some of the uses and properties of magnesia are known. They are quite different in many respects. Of the two, magnesia is the more valuable as a cement. Hitherto it has been obtained from magnesite—a practically pure magnesium carbonate. But magnesium carbonate is a comparatively rare mineral—found on this continent of North America only in three general localities. These localities are far from the centers of population where magnesia is used.

But there is far more to be learned by lime manufacturers from the article in this issue on “The Caustic Calcination of Dolomite and Its Use in Sorrel Cements” than the mere fact that this is a possible source of magnesia. It is the beginning of American literature on the composition and character of dolomite.

It has long been known that an *over-burned* dolomite made a poor lime. It has long been recognized that the disassociation temperatures—the “burning temperatures” in lime phraseology—of magnesium carbonate and calcium carbonate were several hundred degrees apart. The CO₂—carbon dioxide—is much more readily driven off from the magnesium carbonate than from the calcium carbonate.

Apparently most lime manufacturers have proceeded on the theory that it is preferable to drive off *all* the CO₂ and have the magnesium oxide the inert material. Needless to say, this is the most expensive kind of dolomitic lime.

The other alternative of keeping the calcium carbonate inert and the magnesium oxide—the MgO—active does not seem to have entered their calculations. Nevertheless, calcium carbonate—CaCO₃—is *inert*; it is rock, it is limestone. Hard-burned magnesium oxide—magnesia, MgO—is not inert, as experience proves. It will hydrate and change in volume if given the opportunity.

Here, then, is an important fact. We know something of the properties of a lime composed of a combination of hard-burned magnesia and active lime. We know very little of a combination of soft-burned, active magnesia and an unburned, inactive limestone.

Dolomitic lime manufacturers have, perhaps, been blundering near some important discoveries. Until recently they failed to realize that *under-burning* dolomites was a distinct advantage. At least one Ohio hydrate manufacturer has discovered this important fact, and as a result has nearly doubled the capacity of his kilns, cut costs, and produced a superior product.

If nothing else, the article on dolomite, elsewhere in this issue, should arouse the curiosity of live lime manufacturers. A wonderful future of research is opened, the outcome of which no man can foresee. But each dolomite may require special treatment. It is no exaggeration to say that European lime manufacturers 60 to 70 years ago knew more about lime, hydraulic lime and natural cements than do American lime manufacturers today. We shall soon have some articles to prove it.

After slumbering for half a century, the American lime industry is soon to see developments that will make the owners of limestone properties aware of the fact that limestone is not *rock*, but an important *industrial chemical*.

Questions and Answers

Edmund Shaw, Consulting Engineer, Chicago, Ill., Expert on Problems of Screening, Washing and Hydraulic Separation

THE TECHNICAL STAFF
OF ROCK PRODUCTS

Edwin Brooker, Washington, D. C., Consulting Expert on Matters of Transportation and Freight Rates

No. 23. Onyx and Its Uses.—Give me some particulars regarding onyx. Is there any great demand for it? Where is it found?—W. B. K.

A.—Onyx is a marble—a crystalized limestone largely used in decorative work, as for soda counters and numerous other purposes. In the United States it is found in Arizona, California and Colorado, but is not as yet developed on a very large scale. Most of our onyx comes from Mexico, Egypt and Northern Algeria.—N. C. R.

No. 24. Removing Leaves and Trash.—We have a problem in separating leaves and trash from sand and gravel which we take from the Miami river channel. It is excavated and hoisted to a hopper over the screen by a slack line cableway, using a $1\frac{1}{2}$ -yd. bucket. From the hopper the material is sent to a set of 60-in. dull type conical screens. The first screen takes everything out over $\frac{1}{2}$ in. and chutes it to the crusher. The material passing the $1\frac{1}{2}$ -in. screen goes to a $\frac{1}{4}$ -in., leaving a product of the washed gravel $\frac{1}{4}$ in. to $1\frac{1}{4}$ in.—W. P. W.

A.—The writer knows of no very satisfactory method that is in actual use for removing leaves and trash from gravel of the size you mention. A log washer, with a good, lively current flowing over the gravel, ought to do the work, and a plant which is now being constructed is installing log washers for this purpose.

A number of experimental devices have been tried with more or less success. One of these consisted of a box with a slanting screen over a series of pipes. The gravel ran down the screen, and a rising current from perforations in the pipes washed out the trash and leaves and carried them to an overflow at the side of the box. A small elevator lifted the cleaned gravel.

The removal of trash and leaves from sand has been successfully accomplished in a commercial way by the use of hydraulic water in a certain form of automatic discharge settling tank. The method and the machines are described in the article on the plants of the Stewart Sand Co., in the January 13 issue of *ROCK PRODUCTS*.—E. S.

No. 25. Specifications for Sand and Gravel.—What are the specifications for sand and gravel?—A. O. A.

A.—In selecting a sand for plastering purposes, cleanliness, size of grain, sharpness and color are properties of sufficient importance to warrant inspection. In discussing specifications for mortar sand, Condra says: "All sand used for mortar should pass a No. 10 sieve and 80 per cent of it should be retained upon a No. 74 sieve. It should be a silicious sand, as sharp as can be obtained within reasonable limits of cost. It

should be free from all vegetable or organic matter, and should not contain more than 10 per cent by weight of clay or loam."

Cleanness is one of the most important properties to be desired. It has already been shown that clay in moderate amounts is not harmful in sand for concrete work unless it occurs in the form of a coating on the individual grains, in which case it prevents proper adhesion of the cement or lime to the sand grains. Sand in which the grains are so coated should be washed.

The presence of vegetable matter in the form of humus coating the grains of sand, has the same effect as clay and renders a sand unfit for use in the best work. Peat or lignite in the sand has no apparent effect upon the strength of the mortar, but is highly injurious to plastered walls, since it causes the surface of the plaster to pop, leaving small pits.

Size of grain is also of considerable importance. There should be no grains of greater diameter than the thickness of the desired coat of plaster, since they would interfere with the spreading of the mortar, and leave an irregular surface. All grains should pass a 10-mesh sieve, according to Condra. A preponderance of very fine grains is also said to be undesirable, since the plaster does not "clinch" well behind the lath, but "falls" through. A fine sand is also more difficult to mix. According to the same authority, 80 per cent of the sand should be retained on a 74-mesh sieve. A sand of graded grains has a lower percentage of voids, and hence requires less lime or cement, than an ungraded sand, and has a greater strength.

Sharpness is a property universally demanded in specifications in the past, but recent tests seem to show that its importance has been highly over-emphasized. The Bureau of Standards reports that round sand is as good as sharp sand.

The specifications for the filtration plant at Washington which called for proposals for furnishing 140,200 cu. yd. of filter sand and 42,300 cu. yd. of filter gravel were:

"**Filter Gravel.**—On the floor of the filters and surrounding the under-drains shall be placed gravel or broken stone having a maximum depth of 1 ft. Instructions will be given by the engineer officer in charge as to the exact arrangement and position of the various layers when the stone commences to be received upon the ground, but the arrangement will be approximately as follows: The lower 7 in. shall consist of broken stone or gravel which will remain upon a screen with a mesh of 1 in., and

which has but very few stones over 2 in. in diameter. Above this shall be placed $2\frac{1}{2}$ in. of broken stone or gravel which has passed a screen with a mesh of 1 in., and which remains above a screen with a clear mesh of $\frac{3}{8}$ in. Above this shall be placed $2\frac{1}{2}$ in. of broken stone or gravel, which has passed a screen with a mesh of $\frac{3}{8}$ in., and which is coarser than the ordinary sand and entirely free from fine material.

"The material for all layers may be broken trap rock or granite screened to the proper sizes, or gravel screened from sand and gravel banks of a sandy nature. Gravel screened from hardpan or clayey material cannot be sufficiently cleaned. The gravel shall not contain more than a very small amount of shale or limestone. The gravel shall be washed entirely free from fine material, so that water passing through it or agitated in contact with it will remain substantially clean.

"**Filter Sand.**—The filter sand shall be clean river, beach or bank sand, with either sharp or rounded grains. It shall be entirely free from clay, dust, or organic impurities and shall, if necessary, be washed to remove such materials from it. The grains shall be hard material which will not disintegrate and shall be of the following diameters: Not more than one-half of 1 per cent by weight shall be less 0.13 millimeter; not more than 8 per cent less than 0.26 millimeter. At least 7 per cent by weight shall be less than 0.43 millimeter; at least 70 per cent less than 0.83 and at least 90 per cent less than 2.1 millimeters. No particle shall be more than 5 millimeters in diameter, and the sand shall be passed through screens or sieves of such mesh as to stop all such particles, and no screen or sieve shall be used containing at any point holes or passages allowing grains larger than the above to pass. The diameters of the sand grains will be computed as the diameters of spheres of equal volumes. The sand shall not contain more than 2 per cent by weight of lime and magnesia taken together and calculated as carbonates. In all other respects the sand shall be of a quality satisfactory to the engineer officer in charge.

"The filter sand shall be placed in the filters in three layers, each layer to be about 1 ft. thick, and the sand shall not be dropped from a height into final position or otherwise unduly compacted.

"The first two layers may be filled in to only approximate depths and the surfaces need not be smoothed. The final layer shall be brought to a true grade, and the surface left smooth and uniform."—N. C. R.

Crushed Stone Industry Has Biggest Convention

Every Part of the United States and Canada Represented at Chicago on January 15-17. Enthusiastic Endorsement of New Scheme of Organization by Individual \$25-a-Year Memberships. Program Develops Veritable Encyclopedia of Quarry Information

"I GOT more real good out of this convention; I met more of my fellow laborers in the rock products vineyard; I witnessed more enthusiasm; there was more punch, pep, and go-to-it spirit displayed than ever before in the history of the association. We're now on the road to real progress—and will travel fast the coming year if the start we made is any criterion."

These expressions of a veteran member adequately reflect the general sentiments of those who attended the sixth annual convention of the National Crushed Stone

in quarrying to pay \$25 a year in advance. Several big companies have already pledged themselves to take from 5 to 10 memberships for their officers and superintendents. Miss Mary E. Squire, manager of the Allwood Lime Co., is the proud possessor

use the same hard common sense our forefathers used."

Mr. Eames' paper, as well as all others presented during the convention, will be published by official sanction of the National Crushed Stone Association in the March 10 issue of *ROCK PRODUCTS*—the Quarry Manual number.

After the report of the secretary-treasurer, W. C. Huntington, of Welborn and Huntington, business and engineering counsel, read his paper on "Business Principles Applied to Quarry Development and Stone-Crushing Operations."



W. H. Hoagland, First Vice-President

Association, held at the Hotel LaSalle, Chicago, on January 15, 16, and 17.

The big event of the meeting—perhaps the most significant thing of the entire convention—was the decision of the association to make its membership individual and abolish the tonnage basis. To be eligible to membership from now on it is necessary for everyone actually engaged



F. W. Schmidt, President

of the first membership under the new order.

The first morning session opened promptly at 10:30, John Ericson, engineer of Chicago's Public Works, delivering the welcoming address.

President W. Scott Eames in his address dwelt at some length upon matters directly affecting business equilibrium—immigration, transportation, and the social unrest. "Our industry represents a capital of more than \$225,000,000, and our production is enormous. Our organization ought to be made a potent factor to better the present social conditions, and in attempting to rid our country of its socialistic evil, we should all bind ourselves to



W. L. Sporborg, Second Vice-President

Ex-President E. J. Krause, of the Columbia Quarry Co., was unable to present his paper, "Transportation Situation Reviewed," because of pressure of business in the South. It was read by the secretary.

"Transportation," declared Mr. Krause, "is the key to your success in 1923, and the future—plus our own vision and spirit of optimism and determination and our



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own hard work. While we are likely to think of transportation in terms of 'cars furnished,' still, the stone industry can afford to be actively for, and cannot afford to oppose or delay, any practical highway or waterway program."

After a discussion on transportation, there were group luncheons by the agricultural limestone, ballast, concrete aggre-

gate, and granite producers and the machinery and equipment manufacturers.

At the afternoon session papers were read by Waller Crow, Waller Crow, Inc., engineers and financial advisers; J. E. Lindquist, vice-president of the Central Trust Co., of Chicago; Joel E. Watkins, mining geologist.

The report of the research committee,

Harry H. Brandon, chairman, was heard and discussed; and John E. MacLeish, of Scott, Bancroft, Martin and MacLeish, leading counsel for the Gypsum Industries, made an illuminating speech on trade association activities.

In the evening the Bureau of Mines' four-reel film, "The Modern Goliath," was shown, followed by a smoker and general



BANQUET
AMERICAN SOCIETY OF MINERALOGISTS
HOTEL SALLE
NEW YORK CITY
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get-together meeting, at which Secretary Sandles presided.

On Tuesday morning Dr. Bowles presided and made an address on his studies of quarry practice and methods, illustrated by lantern slides.

Papers were also read by Victor J. Mirkowski, engineer of the Morris Machine Works; J. Barab, engineer of the Hercules

Powder Co. There was a discussion on drilling and blasting, led by Alexander McKernan, superintendent of the New Haven Trap Rock Co., with motion pictures; a paper by Otho M. Graves, General Crushed Stone Co.; a general discussion of quarry transportation, led by F. T. Gucker of the John T. Dyer Quarry Co. A. C. Vicary of the Erie Shovel Co.

made the first public announcement of the results of that company's prize contest; H. R. Sykes, Fate-Root-Heath Co., read a paper on gasoline quarry locomotives, and a discussion of quarry labor was led by President Eames and F. W. Schmidt.

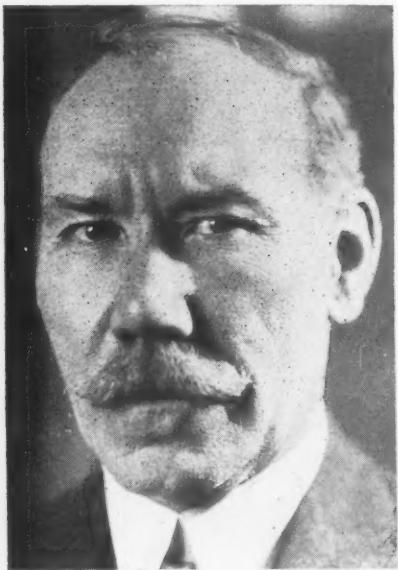
At the noon luncheon the Eastern, Central, Western, Southern and far Western groups met in separate rooms. Professor

Rock Products

January 27, 1923

Ostrander, Indiana Agricultural Experimental Station, addressed the agstone group on co-operation of agricultural workers with agstone producers.

The first part of the afternoon session was devoted to papers on crushers, read by C. G. Buchanan, president of the C. G. Buchanan Co.; W. J. Roberts, president of the Traylor Engineering and Mfg. Co. (Brownell McGrew's paper was unavoidably omitted; it will appear in the Transactions later.) There were papers on washing, crushing and screening by Edmund Shaw, consulting engineer, and L. H. Steward of the Consumers Co.



John J. Sloan, Treasurer

After a general discussion of quarry operation there followed ten-minute papers on new equipment and devices presented by George E. Deatherage, general manager, Hoar Shovel Co.; Thomas H. Robins, Jr., Robins Conveying Belt Co.; Harry Carlson, manager Sandvik Steel, Inc.; C. W. Chappelle, Ironton Engine Co.; W. T. Cavanagh, engineer Kennedy-Van Saun Mfg. and Engineering Co.

The Banquet

At 6:30 in the evening more than 200 members and guests attended the annual banquet in the Grand Ball Room of the Hotel La Salle. John L. Sloan, secretary of the Wisconsin Granite Co., was the toastmaster, and evoked loud praise from all present for his very efficient and graceful handling of the program.

The speakers included President W. H. Finley of the Chicago & Northwestern railway; President C. H. Markham of the Illinois Central Railroad; Dr. William K. Hatt, director, Advisory Board on Highway Research, Division of Engineering, National Research Council; President W. Scott Eames; S. L. Squire, official repre-

senterative of the Canadian Good Roads Congress; James H. MacDonald, treasurer of the American Road Builders' Association, and Secretary A. P. Sandles.

During the dinner the orchestra of the Chicago Glee Club discoursed excellent

**The full Transactions
of the
National Crushed Stone Association
will be published in the
March 10 issue of
ROCK PRODUCTS**

music, and interspersed with the speakers' addresses some very pleasing numbers were sung. Fred C. Murphy, secretary of the Brownell Improvement Co., sang two bass solos which received well-merited applause.

The banquet committee provided a four-page program which contained several popular songs, with words adapted to the industry, in which the guests joined in the choruses.

The entertainment was contributed by E. J. Krause, the Brownell Improvement Co., the Dolese & Shepard Co., the Elmhurst-Chicago Stone Co., the Federal Stone Co., the Inland Crushed Stone Co.,



W. Scott Eames, Chairman, Board of Directors

the A. C. O'Loughlin Co., the Wisconsin Granite Co., and Rock Products.

Papers on cost accounting and merchandising products opened the Wednesday

morning session, read by George W. Hafner, expert cost accountant; George E. Schaefer, sales engineer, General Crushed Stone Co.; R. W. Scherer, sales engineer, Western Lime and Cement Co.; Harry H. Brandon, Ohio Marble Co. The discussion on cost accounting was led by Otho M. Graves, General Crushed Stone Co., and H. E. Bair, France Stone Co., and the discussion on merchandising was led by F. W. Schmidt.

At the noon luncheon in the Red Room, Sidney J. Williams, chief engineer of the National Safety Council, read a paper on "Reducing the High Cost of Accidents."



A. P. Sandles, Secretary

Much interest was manifested in this paper, and the experiences of several producers were related.

Prof. Duff A. Abrams, head of the structural materials research laboratory of Lewis Institute opened the Wednesday afternoon session with a paper on "Stone Screenings as Fine Aggregate for Concrete," followed by "Crushed Stone Railway Ballast," by Theodore Bloecher, division engineer, Baltimore & Ohio, representing the American Railway Engineering Association; "Blast Furnace and Open-Hearth Furnace Fluxing Stone," by J. H. Campbell, engineer R. W. Hunt & Co.; "Co-operation in Industrial Research," S. H. Ingberg, physicist, Bureau of Standards; "Agricultural Limestone," by John T. Woodruff.

A general discussion of the uses of crushed stone followed John J. Sloan's paper on "Special Uses of Crushed Stone."

Shortly before the closing of the final session, Nathan C. Rockwood, editor of Rock Products, was escorted to the platform by Otho Graves and Bradbury Pierce and thanked on behalf of the association for his good work in arranging "the best

Rock Products

program in the association's history." (The writer does not dare to repeat all the nice things President Eames and Mr. Graves said. As it is, we would not say this much, only that Mr. Rockwood is at this writing attending a convention in Washington and cannot therefore wield his trusty blue pencil to our exceeding discomfiture.)

The election of officers resulted as follows:

OFFICERS

President, F. W. Schmidt, Morristown, N. J.
First Vice-President, W. H. Hoagland, Marble Cliff Quarries Co., Columbus, Ohio.
Second Vice-President, W. L. Sporborg, Rock Cut Stone Co., Syracuse, N. Y.

DIRECTORS

W. Scott Eames, New Haven Trap Rock Co., New Haven, Conn.
John Rice, General Crushed Stone Co., Easton, Pa. (New York and Massachusetts).
A. J. Blair, Lake Shore Stone Co., Milwaukee, Wis.
J. J. Scanlan, Wisconsin Granite Co., Chicago, Ill.
A. A. Hall, Ohio Marble Co., Piqua, Ohio.
B. D. Pierce, Jr., Connecticut Quarries Co., New Haven, Conn.
W. G. Swart, Mesabi Iron Co., Babbitt, Minn.
W. W. Boxley, W. W. Boxley & Co., Roanoke, Va.
Norman Hely, Edward Hely & Co., Cape Girardeau, Mo.
O. M. Graves, General Crushed Stone Co., Easton, Pa. (New York and Massachusetts).
A. R. Wilson, Granite Rock Co., Watsonville, Calif.
Allen Patterson, Bluffton-Lewisburg Stone Co., Lima, Ohio.
C. M. Doolittle, Canada Crushed Stone Co., Dundas, Ont., Canada.
James Savage, Buffalo Crushed Stone Co., Buffalo, N. Y.
Howard Bair, France Stone Co., Toledo, Ohio (Indiana and Ohio).
R. W. Scherer, Western Lime and Cement Co., Milwaukee, Wis.
J. F. Schroeder, Linwood Cement Co., Davenport, Iowa.
R. B. Tyler, R. B. Tyler Stone Co., Louisville, Ky.
Thos. McCrosky, American Limestone Co., Knoxville, Tenn.

MEMBERSHIP COMMITTEE

O. M. Graves, Easton, Pa., Chairman.
B. D. Pierce, Jr., New Haven, Conn.
Norman Hely, Cape Girardeau, Mo.
J. J. Sloan, Chicago.
A. R. Wilson, Watsonville, Calif.
N. C. Rockwood, "Rock Products," Chicago.
E. S. Hanson, "Pit and Quarry," Chicago.
T. J. Weston, Columbia, S. C. (Weston-Brooker Co.).
R. B. Tyler, Louisville, Ky.
W. W. Boxley, Roanoke, Va.
A. A. Hall, Piqua, Ohio.
O. H. Binns, Kenneth, Ind. (Casparis Stone Co.).
O. C. Dodson, Texas Stone Products Co., Dallas, Texas.
H. A. Major, Chief Consolidated Mining Co., Salt Lake City, Utah.
I. W. Workman, North Jersey Quarry Co., Morristown, N. J.
Charles A. Freiberg, Buffalo Cement Co., Buffalo, N. Y.
George H. Balfe, Monon Crushed Stone Co., Monon, Ind.
A. J. Blair, Milwaukee, Wis.
W. F. Wise, Stringtown Crushed Rock Co., McAlister, Okla.

The Registration

C. H. Ackerman, Wisconsin Granite Co., Chicago.
E. R. Ackerman, Louis des Cognets & Co., Lexington, Ky.
Charles A. Adams, Service Sand and Gravel Co., Rockford, Ill.
Charles Allen, Allen Cone Co., El Paso, Texas.
H. B. Allen, General Crushed Stone Co., Philadelphia.
W. M. Allen, The Browning Co., Cleveland.
William A. Anderson, Hercules Powder Co., Buffalo.
C. B. Andrews, Taylor-Wharton Iron and Steel Co., High Bridge, N. J.
H. H. Armstrong, J. R. Bent, Illinois Agricultural Association, Chicago.

William A. Armstrong, Universal Granite Quarries Co., Chicago.
C. P. Atwood, S. H. Atwood & Son, Liberty, Mo.
W. J. Austin, Hercules Powder Co., Chicago.
B. R. Babcock, Callahan Road Improvement Co., Albany, N. Y.
H. E. Bair, France Stone Co., Toledo.

Oliver Bowles, Bureau of Mines, Washington.
W. W. Boxley, W. W. Boxley & Co., Roanoke, Va.
Harry H. Brandon, Ohio Marble Co., Piqua, Ohio.
George A. Barnham, Hannibal, Mo.
C. A. Breskin, Rock Products, Chicago.

RESOLUTION ON IMMIGRATION AND RAILROADS

Whereas: The members of this Association have, during the year 1922, found it impossible to obtain a sufficient amount of common labor to properly conduct their business and operate their plants, notwithstanding the offer of extraordinary inducements and wages, and

Whereas: This condition seriously curtailed their output and added greatly to the cost of production and seriously jeopardizes their future business, and

Whereas: This condition has affected not only the crushed stone industry, but has denuded the farms of labor, has seriously crippled, and in some cases caused to be abandoned, the important road-building programs of many states, and has seriously retarded and affected factory production and building construction of all kinds throughout the United States, and is the principal factor in the high cost of all commodities, and

Whereas: Because of the natural shrinkage in the amount of common labor, this condition becomes more acute daily, and

Whereas: It is admitted that the only possible remedy for this condition is immigration of labor from Europe, and

Whereas, mindful of the serious and critical condition of the railroads and public carriers and of the possibility of their merging into one or more great systems or being operated by the government, and aware of the suggestions being freely made as to the curtailing of all road building and construction work in general in the hope of

relieving the present congested freight conditions, therefore

Be it Resolved, That this Association considers the acute shortage of common labor and the railroad situation the most important matters before the American people at this time; conditions that seriously menace the prosperity of the entire population, the big obstacle in the way of 100 per cent prosperity, and further

Be it Resolved, That while this Association does not advocate unrestricted and unlimited immigration, it respectfully urges upon the President and Congress of the United States the urgent necessity at this time of so wisely modifying and amending the present immigration law, that a sufficient amount of common labor may come from Europe to properly man the farms and industries of this country, and further urges that immediate action be taken in the matter, so that beneficial results shall be obtained during the year 1923, therefore

Be it further Resolved, That the president of this Association be instructed to appoint a Committee on Immigration and Railroads to take such steps throughout the ensuing year as may best protect not only the interest of our industry but of industry in general and that this committee be not unmindful of the counsel of the Board of Directors in carrying out this work.

Be it further Resolved, That a copy of these resolutions be submitted to the American Road Builders' Association with a view toward taking such joint action as may best serve our mutual interests.

George H. Balfe, Monon Crushed Stone Co., Monon, Ind.
J. E. Baney, Newton County Stone Co., Kentland, Ind.
J. Barab, Hercules Powder Co., Wilmington.
Donald D. Barnes, Smith Engineering Works, Milwaukee.
C. C. Beam, C. C. Beam, Melvin, Ohio.
P. F. Beam, C. C. Beam, Xenia, Ohio.
L. J. Bennett, Buffalo Cement Co., Ltd., Buffalo.
J. R. Bent, Illinois Agricultural Association, Chicago.
W. E. Beyland, Brownell Improvement Co., Thornton, Ill.
James J. Blaine, Crescent Belt Fastener Co., New York.
A. J. Blair, Lake Shore Stone Co., Milwaukee.
L. C. Bonnell, Commonwealth Quarry Co., Summit, N. J.
T. D. Bower, Scientific Boiler Chemical Works, Chicago.

R. J. Brodhead, Hercules Powder Co., Chicago.
W. W. Browning, Wood County Stone and Construction Co., Bowling Green, Ky.
C. G. Buchanan, Gordon Buchanan, C. G. Buchanan Co., Inc., New York.
J. C. Buckbee, Petoskey Portland Cement Co., Chicago.
Clyde Calvin, Bessemer Limestone and Cement Co., Youngstown.
Harry Carlson, Sandvik Steel, Inc., New York.
Bradley S. Carr, American Manganese Steel Co., Chicago Heights.
A. E. Carroll, Linwood Cement Co., Davenport, Iowa.
W. J. Cavanagh, Kennedy-Van Saun Mfg. and Engine Corp., New York.
O. C. Chapin, Texas Rock Asphalt Co., San Antonio, Tex.
C. W. Chappelle, Ironton Engine Co., Ironton, Ohio.

W. T. Christine, *Cement Mill & Quarry*, Chicago.
 Claude L. Clark, Assistant Secretary National Crushed Stone Assn., Columbus.
 I. M. Clicquennoi, Watertown Stone Co., Milwaukee.
 F. J. Calgan, Calgan Limestone Products Co., Columbus.
 J. K. Costello, *ROCK PRODUCTS*, Chicago.
 H. R. Cox, Rock Cut Stone Co., Syracuse.
 Louis des Cognets, Jr., Louis des Cognets & Co., Lexington, Ky.
 Clinton S. Darling, *ROCK PRODUCTS*, Chicago.
 A. T. Davis, Morgan Eng. Co., Alliance, Ohio.
 George E. Deatherage, Hoar Shovel Co., Duluth, Minn.
 H. Devinson, Waukesha Lime and Stone Co., Waukesha, Wis.
 O. C. Dodson, Texas Stone Products Co., Dallas.
 C. M. Doolittle, Canada Crushed Stone Corp Ltd., Dundas, Ont.
 J. A. Donovan, Oak Park, Ill.
 J. R. Donovan, American Stone Ballast Co., High Bridge, Ky.
 Walter W. Duff, Lake Erie Limestone Co., Youngstown.
 F. C. Diebold, Buffalo Cement Co. Ltd., Buffalo.
 George W. Dunphy, Brownell Improvement Co., Thornton, Ill.
 W. Scott Eames, New Haven Trap Rock Co., New Haven, Conn.
 F. O. Earnshaw, Carbon Limestone Co., Hillsville, Pa.
 George M. Earnshaw, *ROCK PRODUCTS*, Chicago.
 W. B. Eastwood, *Cement Mill & Quarry*, Chicago.
 Myron Edgeworth, Lehigh Stone Co., Kankakee, Ill.
 John Egeworth, Lehigh Stone Co., Kankakee, Ill.
 William Eiler, Grasselli Powder Co., Chicago.
 D. C. Ellison, Consumers Co., Beloit, Wis.
 James T. English, Hugh Murphy Construction Co., Omaha, Neb.
 John Ericson, representing Mayor Thompson, Chicago.
 Mrs. Grace M. Evans, Monon Crushed Stone Co., Monon, Ind.
 Dan Evans, Daniel Evans Stone Co., Marion, Ohio.
 R. C. Faulwetter, Lawrence Publishing Co., Cleveland.
 John L. Faist, Woodville Lime Products Co., Woodville, Ohio.
 Edgar Files, Bluffton-Lewisburg Stone Co., Lima, Ohio.
 P. G. Forman, Columbia Quarry Co., Vammeyer, Ill.
 W. E. Foote, Wickwire Steel Corp., Gasport, N. Y.
 Charles A. Freiberg, Buffalo Cement Co. Ltd., Buffalo.
 W. F. Gainty, Hercules Powder Co., Chicago.
 H. J. Gallagher, Sioux Falls, S. D.
 M. B. Garber, Sanderson-Cyclone Drill Co., Orrville, Ohio.
 J. C. George, Denver Rock Drill Mfg. Co., Scranton, Pa.
 Bruce Z. Good, Loomis Machine Co., Tiffin, Ohio.
 H. T. Gracely, Marion Steam Shovel Co., Marion, Ohio.
 O. M. Graves, General Crushed Stone Co., Easton, Pa.
 C. E. Greeley, Greeley Stone Co., St. Paul.

N. S. Greensfelder, Hercules Powder Co., Wilmington.
 F. T. Gucker, John T. Dyer Quarry Co., Philadelphia.
 Ben Haislip, Traylor Eng. & Mfg. Co., Allentown, Pa.
 H. L. Halberson, Waukesha Lime and Cement Co., Waukesha, Wis.
 A. Acton Hall, Ohio Marble Co., Piqua, Ohio.
 George E. Hall, New Haven Trap Rock Co., New Haven.
 Robert Hambleton, Hagersville, Ont.
 William Hammersmith, Chicago Stone Co., Elmhurst, Ill.
 E. S. Hanson, *Pit and Quarry*, Chicago.
 J. L. Heimlich, LeRoy Lime and Crushed Stone Corp., LeRoy, N. Y.

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Norman L. Hely, Edward Hely Stone Co., Cape Girardeau, Mo.
 J. T. Herrick, Sterling Stone and Lime Co., Delaware, Ohio.
 Charles V. Higgins, Bound Brook Crushed Stone Co., Bound Brook, N. J.
 P. C. Hodges, Marble Cliff Quarries Co., Columbus.
 H. E. Hopkins, *ROCK PRODUCTS*, Chicago.
 J. C. Houston, Browning Co., New York.
 L. D. Hudson, Chalmers & Williams, New York.
 C. M. Hunter, W. W. Boxley & Co., Pounding Mill, Va.
 T. Carl Jansen, Bluffton-Lewisburg Stone Co., Lima, Ohio.
 H. A. Johann, Frog Switch & Mfg. Co., Chicago.
 H. A. Johnston, Ohio Marble Co., Piqua, Ohio.
 H. J. Kaufman, W. J. Keever, Marble Cliff Quarries Co., Columbus.
 M. S. Kincaid, Grasselli Powder Co., Chicago.
 E. H. King, Marion Steam Shovel Co., Marion, Ohio.
 J. C. King, Carbon Limestone Co., Youngstown.
 George D. Kittredge, Albany Crushed Stone Corp., Albany, N. Y.
 C. E. Klaus, Columbia Quarry Co., Columbia, Ill.
 Leo W. Koenigsacker, Linwood Cement Co., Davenport, Iowa.
 F. S. Lack, F. W. Katterjohn Const. Co., Paducah, Ky.
 H. K. Lalawn, Salmon Bros., Nelcong, N. J.
 Leonard J. Lambin, Weller Mfg. Co., Chicago.
 Edgar H. Lamkin, Kelley Island Lime and Transport Co., Cleveland.
 Russell Larcy, Marble Cliff Quarries Co., Columbus.
 E. C. Lemien, John Wunder Co., Minneapolis.
 Miss Louise Lenihan, Monon Crushed Stone Co., Monon, Ind.
 N. H. Lowe, Consumers Co., Chicago.
 J. Harris Loucks, Albany Crushed Stone Corp., Albany.
 A. W. Lannsen, W. W. Boxley & Co., Roanoke, Va.
 Richard W. Lutz, Lutz Stone Co., Oshkosh, Wis.
 Edward Lynch, Hoar Shovel Co., Duluth, Minn.
 H. A. Major, Chief Consolidated Mining Co., Salt Lake City.
 W. H. Margraf, Marble Cliff Quarries Co., Columbus.
 Frank W. Marvel, Sandvik Steel, Inc., Chicago.
 A. L. Mascrip, Consumers Co., Chicago.
 Brownell-McGraw, Allis-Chalmers Mfg. Co., Chicago.
 William McGrew, L. & M. Stone Co., Prospect, N. Y.
 J. A. McGuire, Wisconsin Granite Co., Chicago.
 A. McKernan, Alex McKernan, New Haven Trap Rock Co., New Haven, Conn.
 Henry Meyers, Gopher Stone Co., Minneapolis, Minn.
 Victor J. Milkowski, Morris Machine Works, Baldwinsville, N. Y.
 H. B. Miller, Ohio Marble Co., Piqua, Ohio.
 R. G. Miller, Jr., Browning Co., Cleveland.
 G. R. Moore, Sauerman Bros., Chicago.
 C. A. Moms, American Lime and Stone Co., Bellefonte, Pa.
 John V. Munn, Grasselli Powder Co., Chicago.
 G. A. Murfey, Browning Co., Cleveland.
 J. A. Murphy, Rock Cut Stone Co., Auburn, N. Y.
 Paul M. Nauman, Eagle Point Lime Works, Dubuque, Iowa.
 R. S. Newman, Lawrence Farm Weeklies, Cleveland.
 W. B. Newman, Monon Crushed Stone Co., Monon, Ind.
 E. B. Nichols, Lake Shore Stone Products Co., Sandusky.
 K. E. Nicholson, White Marble and Lime Co., Manistique, Mich.
 W. A. Niland, C. F. Niland, C. B. Whitman Co., Lockport, N. Y.
 A. L. Norton, Norton Stone and Lime Corp., Cobleskill, N. Y.
 John H. Odenbach, Dolomite Products Co., Inc., Rochester.
 J. D. Ohrt, Davis Bros. Stone Co., Lanigan, Wis.
 F. C. Owens, Rock Cut Stone Co., Auburn, N. Y.
 J. G. Owens, Water Street Trap Rock Co., Water Street, Pa.
 Allen Patterson, F. R. Patterson, L. E. Patterson, Bluffton - Lewisburg Stone Co., Lima.
 W. W. Phillips, Grasselli Powder Co., Cleveland.
 W. H. Pugh, New Ulm Stone Co., New Ulm, Minn.
 Bradford D. Pierce, Jr., Connecticut Quarries Co., New Haven.
 V. G. Pogue, Spencer Stone Co., Indianapolis.
 M. S. Randall, Robins Conveying Belt Co., Chicago.
 J. F. Rhodes, Lehigh Lime Co., Chicago.
 Carl G. Rindebusch, Mayville White Lime Works, Mayville, Wis.
 Thomas Robins, Jr., Robins Conveying Belt Co., New York.
 W. D. Robinson, Toledo Stone and Glass Sand Co., Toledo.
 Nathan C. Rockwood, *ROCK PRODUCTS*, Chicago.

J. L. Rose, Sanderson-Cyclone Drill Co., Orrville, Ohio.
 R. H. Rossiter, Marion Steam Shovel Co., Marion, Ohio.
 T. A. Ruddy, Stephens-Adamson Mfg. Co., Chicago.
 S. R. Russell, E. I. du Pont De Nemours Co., Wilmington.
 A. P. Sandles, Secretary National Crushed Stone Association, Columbus.
 James Savage, Buffalo Crushed Stone Co., Buffalo.
 Norman Schaefer, Luverne Stone Co., Luverne, Minn.
 George E. Schaefer, General Crushed Stone Co., Rochester.
 F. W. Schmidt, F. W. Schmidt, Jr., Morris County Crushed Stone Co., Morristown, N. J.
 John F. Schroeder, Linwood Cement Co., Davenport.
 A. G. Seitz, Rock Cut Stone Co., Syracuse.
 H. M. Sharp, France Stone Co., Toledo.
 Albert R. Shiely, J. L. Shiely Co., St. Paul, Minn.
 A. J. Shoemaker, General Explosives Co., Chicago.
 J. J. Sloan, Wisconsin Granite Co., Chicago.
 V. I. Sloan, Universal Granite Quarries Co., Chicago.
 Charles Smith, Smith Bros., Hackettstown, N. J.
 Earl C. Smith, Osgood Co., Marion, Ohio.
 L. D. Smith, Leathem Smith Stone Co., Sturgeon Bay, Wis.
 W. S. Snyder, Templeton Limestone Co., Templeton, Pa.
 A. J. Sorem, General Electric Co., Chicago.
 A. N. Spencer, Texas Rock Asphalt Co., San Antonio.
 H. T. Spiva, General Explosives Co., Chicago.
 W. L. Sporborg, Rock Cut Stone Co., Syracuse.
 Mary E. Squire, Allwood Lime Co., Manitowoc, Wis.
 Sheldon Stearns, Worthington Pump and Machinery Corp., New York.
 Charles Steffies, Toledo Stone Co., Toledo.
 E. M. Stephanus, Broderick & Bascom Rope Co., St. Louis.
 L. H. Steward, Consumers Co., Chicago.
 John W. Stull, Liberty Lime and Stone Co., Rocky Point, Va.
 C. L. Suessmann, Ohio Marble Co., Piqua, Ohio.
 A. J. Sullivan, Inland Crushed Stone Co., Chicago.
 J. J. Sullivan, Dolese & Shepard Co., Chicago.
 Thomas Sullivan, National Stone Co., Omaha.
 W. G. Swart, Mesabi Iron Co., Babbitt, Minn.
 J. A. Thurssen, Linwood Stone and Cement Co., Davenport.
 Irving S. Tucker, Connecticut Quarries Co., New Haven.
 L. M. Trinnon, Middle Valley, N. J.
 R. B. Tyler, R. B. Tyler Stone Co., Louisville.
 William H. Wallace, Jr., Wallace Stone Co., Bay Port.
 J. J. Watson, Green Road Stone & Supply Co., South Euclid, Ohio.
 S. G. Wells, George & Sharrard Paper Co., Wellsburg, W. Va.

F. A. Westphal, Sandvik Steel, Inc., Chicago.
 T. I. Weston, Weston & Brooker Co., Columbia, S. C.
 George J. Whelan, Kelley Island Lime and Transport Co., Cleveland.
 W. W. Whitman, C. B. Whitman Co. Inc., Lockport, N. Y.
 H. S. Willingham, Willingham-Little Stone Co., Atlanta.
 A. R. Wilson, Granite Rock Co., Watsonville, Calif.
 Charles Winzell, Universal Granite Quarries Co., Lohrville, Wis.
 W. F. Wise, Stringtown Crushed Rock Co., McAlister, Okla.
 William Wiske, Wisconsin Granite Co., Ridgeman, Wis.
 James R. Withrow, Ohio State University, Columbus, Ohio.
 L. T. Wookey, Canada Crushed Stone Co., Dundas, Ont.
 F. C. Wolf, Waukesha Lime and Stone Co., Waukesha, Wis.
 C. E. Wood, C. E. & C. W. Wood, Los Banos, Calif.
 D. W. Wortman, North Jersey Quarry Co., Morristown, N. J.
 A. L. Worthen, Connecticut Quarries Co., New Haven.
 H. E. Wunder, Harvey J. Wunder, Trap Rock Co., Dresser Junction, Wis.
 John Wunder, Trap Rock Co., Minneapolis.
 Newton B. Vanderzee, Albany Crushed Stone Corp., Albany.
 A. R. Voss, Voss Stone Co., New Ulm, Minn.
 R. C. Yant, Hugh Murphy Construction Co., Omaha.
 C. M. Young, Cincinnati Rubber Mfg. Co., Indianapolis.

Conventionalities

C. M. DOOLITTLE did much by his presence to make smooth the line that separates us from Canada. His company is the Canada Crushed Stone Corp., at Dundas, Ont.

SPEAKING OF H. E. BAIR, France Stone, we had a fit when the printer spelled France with a "T." But we caught it in time.

TOM SULLIVAN, National Stone, Omaha, always witty and wise, told the convention

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it was worth the membership fee alone just to listen to Brad Pierce's flow of oratory.

THE WASHINGTON FOLKS? Well, we saw Dr. Bowles, mineral technologist, and a four-reel film, "The Modern Goliath"; Dr. Ladd, Bureau of Public Roads; Dr. William K. Hatt, and Sidney J. Williams, National Research Council; and S. H. Ingberg, physicist, Bureau of Standards.

HARVEY GRACELY, Marion Steam Shovel,

told us some mighty interesting things about E. H. King, a veteran in the industry. Ol' Lyman Sandrock will write a story soon about Mr. King that will tell you some "long-ago" stuff as to shovel work.

ACTON HALL, Ohio Marble, entertained 10 guests at his table on banquet night. He expressed his gratitude most suitably for the one-table privilege.

JUDGE VANDERZEE, Harris Loucks and G. D. Kittredge, Albany Crushed Stone, newcomers to our midst, spent two busy days here.

EDGAR LAMKIN, Kelly Island and— Oh, shucks! everybody knows Edgar and his affiliations and what a bully fellow he is.

MISS MARY E. SQUIRE and (Miss) Dr. Carpenter, Allwood Lime, expressed their deep appreciation of the first opportunity to sit in the convention sessions. Miss Squire was the first new member under the changed membership plan.

WILLIAM McGREW, L. & M. Stone, came on from Prospect, N. Y. One of his sons is Brownell McGrew, Allis-Chalmers.

J. D. OHRT, Davis Bros., entertained a party of four at the banquet—and looked happy and contented.

THE BLUFFTON-LEWISBURG STONE CO. is always well represented at our conventions. Of course Allen, F. R., and L. E. attended.

NOT MANY associations can boast of a more distinguished speakers' table than at the banquet. Two railroad presidents, a Canadian Good Roads Congress representative, a New Jersey senator, a member of the Research Council, our inimitable secretary, and a prince of toastmasters.

"BRAD" PIERCE, Connecticut Quarries, darted thither and yon so sartorially arrayed as to put to blush the late lamented Solomon and the well-known lilies of the field. And Brad was not alone—in fact, there were times when the La Salle corridors looked like an Easter parade in ol' N'Yawk.

WE LUNCHED with President C. G. Buchanan and son Gordon, and enjoyed it greatly. Gordon told some good Southern stories that would make Irv Cobb envious—clean as a whistle, but pointed.

CLAUDE CLARK, as usual, was on the job early and late, piloting the newcomers and catering to the wants of the many.

BROTHER VOLSTEAD would have gleefully noted the absence of John W. Barleycorn, Haig & Haig Quarries, had the brother hit with his songs, both at the smoker and the majority of us were satisfied, at that.

GENERAL REGRET was expressed over the announcement that ex-President E. J. Krause was unable to be with us. Better luck next time, E. J.!

FRED MURPHY, Brownell Improvement, as a basso profundo excellenzio, made a big hit with his songs, both at the smoker and the banquet.

WALTER CROW, we hear, is an accomplished musician as well as engineer. This is due notice, old man, that you are requisitioned for the next banquet.

JOHN J. SLOAN, it was concluded on all sides, was a most accomplished toastmaster. He has the rare gift of saying just enough—and letting the speakers do the talking.

A CONVENTION without a Sullivan is "Hamlet" with Hamlet left out. Of course,

Rock Products

January 27, 1923

J. J. Doles & Shepard, and A. J., Inland Crushed Stone, were there.

OUR OLD FRIEND, James Savage, Buffalo Crushed Stone, gave us a warm handclasp and made us believe he was glad to be in our 'mongst. His gold mine in the frozen North did not keep him away.

A. R. WILSON, Granite Rock, came on from Watsonville, Calif. It was his first convention. Publication of the fine program brought him, as it doubtless did many others.

THE MONON FAMILY—Mrs. Grace M. Evans, Miss Louise Lenihan, George H. Balf and W. B. Newman—were attendants at the sessions and the banquet.

WALTER W. DUFF, Lake Erie Limestone, says he came to find out how much he didn't know about operating a quarry and to hire a competent engineer. He accomplished both purposes. C. A. Adams, formerly of the Service Sand and Gravel Co., Rockford, Ill., is his new engineer.

F. O. EARNSHAW, Carbon Limestone, certainly worried the hotel's Western Union desk about an expected message from his wife. When it came—well, it read: "I can't come to Chicago." We could almost see tears between words.

C. E. KLAUS, Columbia Quarry, as a safety-first measure, brought along P. E. Forman, his assistant, to back him up.

J. C. KING, Carbon Limestone, put over a mighty interesting story, but some arrangement should be made at the next convention whereby he can get a sandwich when he wants it.

W. H. MARGRAF, Marble Cliff Quarries, says he enjoys coming to Chicago; he knows the town so well. But we've been told he got lost on Lake street, just the same.

CLYDE CALVIN, Bessemer Limestone, according to Secretary Sandles, did not find Chicago entertainers good conversationalists. You'll have to ask Clyde or A. P. what the one-word vocabulary consisted of.

FEW MEN knew that one quiet visitor had seen four years of hard service in France in the Royal Engineers, or that he had quarried stone in England for many years before coming to the Brownell Improvement Co. at Thornton, Ill. That man was D. C. Ellison, at present superintendent of the Consumers Co. gravel plant at Beloit, Wis.

J. C. KING, Carbon Limestone, agstone enthusiast, is as full of his subject as the minister who announced himself so to be when he gave as his subject, "Moonshine Liquor."

WHEN W. G. SWART, Mesabi Iron, wants to buy some equipment no obstacle can stop him. And there are few production difficulties so tough that they trouble him long.

BEN STONE, Merom Gravel, and C. E. Wood, of Los Banos, Calif. became friends at the convention. When last seen they were coming out of the Good Roads Show each armed with husky-looking yardstick canes. They were hunting for the man who wrote that one about: "Wood turned to Stone and Stone turned to Wood and then they both turned to rubber."

CHARLES ALLEN, Allen Cone Co., El Paso, Texas, was a visitor. He made the tonsils of some of the members itch as he described the irrigation possibilities that exist in

Juarez Mex., connected with El Paso by a streetcar line.

Thirteenth American Good Roads Congress a Great Success

ROCK PRODUCTS producers attending must have derived great satisfaction from the twentieth annual convention of the American Good Roads Association, held in Chicago on January 15 to 19. It was conclusive proof that this body has achieved success in their long fight.

The convention hall was swamped by the attendance at all sessions which were mostly given up to the broader discussions of good roads work—such as co-operation in research, finance legislation, and the application and control of motor traffic.

Progress in highway development—and therefore the development of a large market

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for rock products—was demonstrated by the remarks of Senator James H. MacDonald of New Haven, Conn., and treasurer of the association, who remembered that the first convention, 20 years ago, found him addressing an audience composed mostly of the band hired to provide entertainment, while this year they had to move the band to make room for interested listeners.

Papers read at the convention of particular interest to producers of rock products were:

"Developments in the Use of Local Materials" by Vernon M. Pierce, district engineer United States Bureau of Public Roads; "How to Equip and Operate Local Gravel Pit to Produce Concrete Aggregate" by H. E. Kuelling, constructing engineer, Wisconsin Highway Commission; "What Road Building Can Be Done in Winter," by John H. Mullen, chief engineer, Minnesota Highway Department.

The exposition of machinery and equipment was characterized by the large increase in the number of practical devices for the production of road-building materials and the building of roads. There was also a tendency toward heavier machinery, more solidly and efficiently designed. The visiting members of the National Crushed Stone Association, in session at the Hotel LaSalle, on January 15, 16 and 17, were in evidence during their three-days' stay in Chicago.

Visiting Eastern Lime Plants

"IND out how the other fellow is doing it." That's the motto of H. A. Major, of the Chief Consolidated Mining and Quarry Co., Salt Lake City, who is on a long trip of inspection through the Eastern states.

His company, which is one of the largest silver producing companies in the country, has recently entered the crushed stone and lime industries and Mr. Major, who is in charge of this department, left Salt Lake City on this inspection trip January 5.

He stopped at Denver, Canyon City, Colo., and South Bend, Mo., and at Chicago he attended the convention of the National Crushed Stone Association. His trip will be continued through the East to visit lime plants and quarries at Rodgers, Mich., Toledo, Marion, Columbus, Buffalo, Pittsburgh and other points.

Death of Harry M. Hallock

HARRY M. HALLOCK, who was vice-president of the Chicago & Illinois Midland Railway, and executive vice-president of the Consumers Co., Chicago, died at his home in Chicago, on January 17. The funeral services were held on January 19, at Oriental Consistory Hall, in that city.

The following well-known friends and business associates of Mr. Hallock acted as pallbearers: D. S. Boynton, Stuyvesant Peabody, M. E. Keig, F. H. Pearson, G. C. Hager, Henry Hooper, Walter Provine, C. G. Ferris, Fred W. Upham, George F. Getz, T. C. Boynton, C. D. Caldwell, James A. Patten, Col. William N. Pelouze, Gerard B. Winston, William Wrigley, Jr., Louis Eckstein, Frank G. Logan, Edward W. Sims, James W. Alder.

Concrete Pipe Association's Annual Convention

THE annual convention of the American Concrete Pipe Association was held at the Hotel Sherman, Chicago, on January 19. President A. N. Sherman of Knoxville, Tenn., outlined the situation and said that in the six years since the association was founded, the output of the members has increased more than 3000 per cent. The industry is facing the most prosperous year in its history in consequence of the extensive plans for highway construction, the enormous building program, and the activities of the railroads in right-of-way betterment. Last year 300,000 bbl. of cement were used by the industry, but this year it will consume more than 500,000 bbl.

Among the speakers were E. F. Bent, Los Angeles, Calif.; R. H. Allison, Mankato, Minn.; G. G. Robinson, Toronto, Can., and S. A. Swanson, Hastings, Neb.

Traffic and Transportation

By EDWIN BROOKER
Munsey Building, Washington, D. C.

Railroads and Good Roads

THE *Traffic World* for January 13 rushes to the defense of the railroads, as a result of a speech made in Congress by Representative Robson of Kentucky. He declared he was convinced there was a concerted movement, both in and out of Congress, to hamper and obstruct the federal-aid road program and that some of the railroads had become active in the fight against federal aid. The construction industry has been aware of such opposition for some time and therefore it is difficult to understand why such defense is necessary. They say:

We do not know of any railroad movement to hamper the giving of federal aid for the construction of good roads. On the contrary, it is our belief that the railroads are too complacent with respect to the use of public money for road construction. Not that we do not believe in good roads. We do. But we think the railroads in justice to themselves and in the interest of fairness, should protest against a policy that requires them, with the rest of the public, to contribute to the building of roads used by their motor-truck competitors with no compensation from these motor-truck common carriers to the state for the use of the highways for moneymaking purposes. We think the railroads could very well protest against federal aid except to such states as require motor-truck common carriers to pay a special tax over and above that paid by vehicles in private use.

It is a well-known fact that the railroads are not adequately equipped to handle the commerce of the country. We hear complaints from all sides of insufficient service, a shortage of cars, a lack of motive power and embargoes here and there. The motor truck furnishes what is lacking in the way of railroad facilities, and while the railroads might lose some tonnage thereby, it is usually short-haul, merchandise traffic which, on account of the amount of handling required, has never been attractive tonnage to the railroads.

We do not attempt to defend a policy of permitting heavy-loaded motor trucks to use the highways of the country, without contributing a just proportion of the cost of the maintenance of such highways. If the activities of the railroads in their opposition to the good-roads program were limited to such a policy, we could not object.

The construction industry notices this opposition in another way. The disposition of the railroads to charge the highest possible rates on such low-grade commodities as sand, gravel and crushed stone is one method by which they restrict the amount of good roads which are built; it shows a determination on their part to get all they can out of any road-building activity in progress. By such a policy they make the cost of delivering these materials so high that authorities are disposed to loosen up on

the specifications and permit the use of improperly prepared materials and the established plants not only lose the sale of the materials, the railroads lose the handling of the tonnage, which they seem willing to forego, but it results in the building of inferior roads which in a short time, go to pieces and cost a great deal more for maintenance as a result thereof. It is a policy which tends to stir up antagonism by the taxpayer—all because the railroads are fearful of a supposed competitor, the motor truck.

In times of a car shortage and a lack of transportation facilities, the construction industry is the first to suffer by a denial of transportation to producers of sand, gravel and crushed stone, in order to permit the handling of coal to non-essential industries. The railroads do not stop to think that this shortsighted policy on their part also affects the movement of steel, lumber, lime, cement and many other building materials also used in construction work. Their main purpose seems to be to retard the road-building program, all because of an apparent nightmare, the motor truck.

Proposed Interstate Mileage Scale for Northwest

A PROPOSITION is contained in Western Trunk Line Docket No. 2898 to establish a uniform mileage scale on sand, gravel and crushed stone for interstate movement, between points in Iowa, Minnesota and Wisconsin. The proposed scale follows:

Miles	Proposed Rates	Miles	Proposed Rates
5	\$0.50	200	\$1.50
25	.65	250	1.60
50	.80	300	1.70
75	.95	350	1.80
100	1.10	400	1.90
125	1.20	450	2.00
150	1.30	500	2.10
175	1.40		

This scale is higher than the present basis applying on shipments moving between points wholly in the state; it is also both higher and lower than special commodity rates on these materials for interstate movement in this territory. It would be interesting to know whether the railroads intend to apply this scale, if approved, as a maximum scale only, permitting lower commodity rates where now in effect to continue, or whether the establishment of this scale will be followed by an attempt to cancel all commodity rates.

The fact that present state mileage scales which have been prescribed by the state commissions of the state affected by this

change are on a lower basis, makes this proposal extremely dangerous. It might afford a basis, if established in such a widespread territory, for the railroads to make an appeal to the Interstate Commerce Commission to have the state rates placed on the same basis for the purpose of removing discrimination between the state and interstate rates.

It is therefore important for the producers to see that any scale established should be on the lowest possible basis obtainable, and to more nearly on a uniform level with the state scales.

Chicago District Rate Hearing

THE Illinois Freight Association, by bulletin dated January 6, invited shippers and receivers of sand and gravel to attend a joint hearing of the Central Freight Association and Illinois Freight Association held at Transportation building, Chicago, on January 17, in connection with the proposal to revise rates on these commodities from points in Illinois, Indiana, Michigan and Wisconsin points to the Chicago district. The proposed rates are:

	A	B
Algonquin, Ill.	\$.60	\$1.00
Chillicothe, Ill.	.88	1.28
Janesville, Wis.	.65	1.05
Lafayette, Ind.	.88	1.28
Libertyville, Ill.	.60	1.00
Waukesha, Wis.	.66	1.05

A.—To facilities of the roadhaul carrier.

B.—To facilities within the Chicago district available under L. A. Lowrey's Tariff 20 Series.

Railroad Tonnage for 1922

THE following comparison of loaded freight cars handled by the railroads is interesting. It was taken from figures made public by the American Railroad Association.

Year	Total loaded cars
1918	44,755,041
1919	42,180,328
1920	45,118,472
1921	39,323,158
1922	43,713,519

The year 1920 seems to be the banner year and 1,404,953 more loaded cars were handled during that year than for 1922. The total number of cars of coal for the year 1920 exceeded the amount handled for the year 1922 by 2,634,109 cars. It is very evident that if transportation had not been hampered by the coal and railroad strikes of 1922, that last year would have been the greatest in the history of railroads. The amount of loaded cars to all other freight, excluding coal, handled during 1922 exceeded the figures for the year 1920 by 1,229,156 cars.

Slag Complaint Dismissed

THE Commission has dismissed the complaint of the Southern Manganese Corporation vs. Director General, Docket No. 13101, finding the rates on slag, under federal control, from Anniston to Gadsden, Ala., not unreasonable. The Louisville & Nashville railroad, which as a general proposition maintains a higher basis of rates on road materials than many other Southern railroads, was the defendant railroad, and its mileage scale rate of 80 cents per ton for a 30-mile haul, was upheld.

Proposed Changes in Rates

Central Freight Association

5799. Sand from Carlton, Mich., to various points in Michigan. Port Huron, 88 cents; Detroit and Pontiac, \$1.13; Flint and Lapeer, \$1.26. Bay City and Saginaw, \$1.39.

5801. Lime, Woodville and Gibsonburg, Ohio, to Sheffield, Ill., 19 cents.

5802. Crushed Stone, from Bloomville, Ohio, to Findlay, Ohio, \$1 per ton.

5805. Sand and gravel, from Gravel Pit, Ohio, to Kennedy Heights, Silverton and Deer Park, Ohio, 80 cents per net ton.

5811. Moulding Sand, Zanesville District, Ohio to Port Huron, Mich., present \$3.15, proposed \$2.52 per net ton.

5837. Crushed Stone as follows:

	To CLS&SB Ry. stations		From Thornton Kankakee and McCook, Ill.		Lehigh, Ill.	
	From Thornton	From McCook	Pres. Prop.	Pres. Prop.	Pres. Prop.	Pres. Prop.
Tremont, Ind.	83	95	96	108		
Michigan City, Ind.	86	95	99	108		
Wilhelm, Ind.	95	101	108	114		
Sagunay, Ind.	95	101	108	114		
Hudson Lake, Ind.	95	101	108	114		
South Bend, Ind.	99	101	112	114		

	To Mich. Cent. Ry. Stations		From Thornton		Kankakee	
	From Thornton	From McCook	Pres. Prop.	Pres. Prop.	Lehigh, Ill.	Pres. Prop.
East Gary, Ind.	86	76	99	89		
Crisman, Ind.	86	92	99	105		
Furnesville, Ind.	86	92	99	105		
Michigan City, Ind.	86	95	99	108		
New Buffalo, Mich.	95	101	108	114		
Barnett Siding, Mich.	95	101	108	114		
Buchanan, Mich.	95	101	108	114		
Niles, Mich.	95	101	108	114		
South Bend, Ind.	99	101	112	114		

Illinois Freight Association

1572A. Sand and gravel, from Rockford to Mendota, Ill., 76 cents per net ton.

1626. Sand and gravel, minimum weight marked capacity of the car, from Brookport and Metropolis, Ill., to various points in Illinois on the Southern Railway, viz.: Mt. Carmel, Mounds, Belmont, Albion, Ellery, Golden Gate, Merriam, Fairfield, Boyleston, Sims, Wayne City, Keenes, Bluford, Marlow, Mt. Vernon, Idlewood, Dix and Walnut Hill, Ill., proposed rate \$1.26 per net ton.

1627. Sand and gravel, minimum weight marked capacity of the car, from Grayville, Ill., to Southern Railway stations as follows: Ellery, Golden Gate, Merriam, Fairfield, Boyleston, Sims, Wayne City, Keenes, Bluford, Morlon, Mt. Vernon, Idlewood, Dix and Walnut Hill, Ill., \$1.26 per net ton.

1628. Crushed Stone, from Leroy and Kankakee, Ill., \$1.01 and from Thornton, Ill., \$1.14 per net ton, to Forsyth, Emery, Maroa and Craig, Ill.

1635. Sand and gravel, minimum weight 90 per cent of marked capacity of car, from Yorkville, Ill., to Fitchmore and Peterson, Ill., \$1 per net ton.

1632. Sand and gravel, minimum weight 90 per cent of marked capacity of the car, from Chillicothe to Peoria and Peoria Heights, Ill., 50 cents per net ton.

Southern Freight Association

8562. Crushed Stone, minimum weight marked capacity of the car from Ladds and Portland to Brunswick, Ga., Fernandina and Jacksonville Fla., \$1 per net ton.

present, \$2.03, proposed, \$1.98. To Charleston, S. C., present, \$1.80, proposed, 1.94. To Savannah, Ga., present, \$1.80, proposed, \$1.89. Proposed rates are subject to Agent Jones Combination Tariff 228.

8565. Cement, natural or portland, from Chattanooga, Tenn., to N. C. & St. L. stations west of Chattanooga, Tenn. Present rates as published in N. C. & St. L. Tariff I. C. C. 2780A. It is proposed to establish rates in line with rates at present applicable from Richard City, Tenn. Proposed rates to representative points are: to Bridgeport, Ala., 11, to Sherwood, Tenn., 11, to Tullahoma, Tenn., 11, to Richard City, Tenn., 11½ cents per 100 lb. Rates to Tracy City branch, Shelbyville branch, Sparta branch, Columbia branch, Huntsville branch, Lebanon branch, and all points west of Nashville on the Nashville and Paducah & Memphis divisions, to be made the same as from Richard City, Tenn.

8575. Lime, minimum weight 30,000 lb., from Cumberland, Ala., Sherwood and Summittville, Tenn., to Clover, S. C. It is proposed to establish through rates from Cumberland and Sherwood of \$3.87 and from Summittville \$3.98 per net ton, in lieu of present Atlanta Combination rates of \$5.07 from Cumberland and Sherwood and \$5.18 from Summittville.

8577. Lime, minimum weight 30,000 lb., from Cumberland, Ala., and Sherwood, Tenn., to Buford, Ga., present Atlanta combination rates of \$2.47, proposed \$2.31 per ton; from Summittville, Tenn., to Buford, Ga., present \$2.58, proposed \$2.43 per ton.

8599. Cement, from Ragland, Ala., to Leeksburg, Spray, Meadow Summit, Draper, Fitzgerald, N. C., and Martinsville, Va., present rate 28½ cents, proposed 26 cents per 100 lb.

8600. Cement, from Ragland, Ala., to East Carolina division stations, between Charleston, S. C. and Savannah, Ga., on the Seaboard Air

Ry., Doty, Tex., to South Beaumont, Tex., inclusive, also to Bartholomew Lbr. Co., Spur, Tex.; rate of 6½ cents to T. & Ft. S. Ry. stations; Texas to West Port Arthur, Tex., inclusive; rate to Doty and Sun, Tex., to apply from Johnson Pit only. Shippers contend proposed rates are necessary to move traffic when consigned to state, county or municipal officials, for use in building good roads or streets and when the county or municipality pays the freight charges.

7378. Cement. To establish on portland cement, minimum weight, 38,000 lb., from Ada, Okla., to Shidler, Okla., on the Osage Ry., same rates as at present applicable to Foraker, Okla. It is claimed proposed change is desired to provide specific commodity rates to Shidler, a station on the newly constructed Osage Ry.; also to place Ada, Okla. on a parity with gas belt points of origin.

7387. Sand, from Ottawa and Utica, Ill., to Springfield, Mo., 18 cents per 100 lb. Shippers claim present rate to Springfield is prohibitive, and that proposed rate compares favorably with present rate from Utica, Ill., to Kansas City, Mo.

Western Trunk Line Committee

2903. Sand, Gravel, Crushed Refuse Gravel, Crushed Concrete Gravel, Sand and Gravel Pit Strippings and Cinders, from Okauchee, Wis., to Chicago, Ill., present rate 7½ cents per 100 lb., proposed rate 4 cents per 100 lb., minimum weight 90 per cent of marked capacity of the car, except that actual weight will govern where car is loaded to full visible capacity, but not less than 40,000 lb.

2271A. Stone, broken or crushed. From Dell Rapids and Sioux Falls, S. D., to Elkader, Ia., present 16 cents, proposed 12 cents per 100 lb.

First Aid in Wisconsin Quarries

ARRANGEMENTS are being made by the Wisconsin Industrial Commission whereby the U. S. Bureau of Mines will give first-aid instructions to men employed by the quarry and gravel pit operators. The meetings will be held during February and March. The following cities are centers for the quarrying industry and will be favored with the meetings: Racine, Milwaukee, Mayville, Menasha, Fond du Lac, Green Bay, Janesville, Ablemans, and Wausau. The exact dates of the meetings are to be announced later as the car is laid up for repairs in Chicago.

The orders on safety in quarries of the Industrial Commission provide that each quarry shall have two men competent to render first-aid to an injured person. Eleven meetings were held last winter and 208 quarrymen received first-aid certificates. Some of these men were able to render valuable services to those who were seriously injured in the quarries and gravel pits during the last summer. Quarries are as a rule located several miles from the nearest doctor and accidents often result in serious injuries.

The course of training consists of demonstrations in which the men themselves assist. The work is divided up as follows:

1. The proper methods of stopping arterial bleeding from cuts and wounds;
2. The proper and approved methods of applying bandages to various parts of the body;
3. The splinting of fractures;
4. Artificial respiration;
5. Proper transportation and care of the injured during transportation.

The full Transactions

of the

**National Crushed Stone Association
will be published in the
March 10 issue of
ROCK PRODUCTS**

Accident Prevention

The Blaster's School as an Aid to Safe Quarry Operation

By Dr. E. M. Parlett

Supervisor, Safety and Health, Pittsburgh Limestone Co., New Castle, Pa.

WHILE the blasters' schools, organized at each of the mines and quarries (a number recently acquired) of the Carnegie Steel Co.'s limestone subsidiary plants may themselves be unique as probably the first of their kind known, yet they are but the natural outgrowth of what might be termed an operating necessity and therefore merit no special commendation for ingenuity of thought or action.

In 1920, when the writer became affiliated with the limestone interests of the United States Steel Corp., limestone was being drilled and blasted in quarries and mines as was customary, and, of course, still is, by the use of black powder and dynamite. The employes who were handling explosives for the most part were of foreign extraction, interested in their specialty, efficient in accordance with their practices, eager to learn, and of average or above average intelligence.

Dynamite is one of the most dangerous materials on earth to handle, and when the man who handles it is below average mentally, careless, and faulty in technique, or plainly ignorant of its destructive potentialities and correct usage, the accident which inevitably happens is usually either major in character or fatal, and, very frequently, material destruction to property ensues.

A study of practices in vogue at the various plants showed that the methods of transportation, loading, priming, tamping and storing, differed somewhat, both in minor and major detail; the reasons for these differences were also investigated with the idea, if possible, of standardizing every feature in connection with the problem concerned. It was then proper to go forward a step and consider the method of transporting the explosives to the plants, and therefore their storage until ready for use.

A standard type magazine was thus developed which would insure proper spacing, proper ventilation, proper protection from fire and bullets, proper distance from highways, communities and railroads. The method of transporting from the powder

magazine to the quarry or mines was next in line of sequence for study. Standard method of drilling, loading, priming and of battery and direct current firing were accordingly established, after which unquestionably the cardinal subject of all for consideration.

For the most part, limestone mines and quarries, by virtue of their character, are located in more or less isolated communities; men from foreign countries who locate in such communities are, therefore,

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remote, in a degree, from urban civilization, night schools, entertainment or other means of amusement and education. In the past, notwithstanding instructions given by the quarry superintendent, the new man would frequently follow the practice of the old-timer who through his familiarity with explosives took reckless chances, sometimes with disastrous effects, personally. Methods in vogue a decade or more ago are not those of the present day, and frequently the old methods were those which the pupil learned, not having the opportunity to appreciate through education the difference between those and the more safe and modern methods of dealing with explosives. I am glad to say that among our men we found exceptions to this condition of affairs, and it may be that there

are many other exceptions to this rule in allied industries.

There is no doubt but that a great many of the older practices were faulty, and not a few there may be who, disregarding instructions, still adhere to faulty practices, for example: such acts as crimping the cap to the fuse by means of the teeth; tamping a hole with a metal bar, or using a steel auger to clean out a misfired hole; carrying open lights while handling dynamite and caps; using a pick to open powder cans, a hatchet or chisel to open dynamite boxes; transporting dynamite, caps and matches in the same container; lighting a fuse before inserting the stick of dynamite containing the cap in the drilled hole, and many other as crude and dangerous practices. Is it any wonder that in years gone by in mine and quarry work, many hands and arms and legs have been dismembered or mangled, or that the operators themselves have in many instances been blown to shreds?

Experience, skill and high-grade efficiency are required for the modern operation of a huge quarry or mine. The character of the stone, its cleavage, etc., must be given scientific consideration. The method of drilling in itself materially enters into the successful operation of limestone mines and quarries. Careful thought and experience must be brought to bear in determining the proper strength and brands of dynamite and caps to be loaded into holes of a given depth in a certain character of stone to obtain the proper sizes when blasted, and which can best be utilized by the crusher and, in turn as a flux by the various types of blast-furnaces.

Equal consideration must be given to the manner of loading and connecting up a series of holes and to the number of such holes which can be properly fired by fuse, battery or direct current. Many other matters enter into the skillful and successful drilling, loading, tamping, connecting, and firing of mine room or open quarry shots, not only in order to obtain the maximum quantity of stone per unit of powder used, but to have it thrown down in proper size and in such a manner as not to interfere with the scientific and economic progress of the work. But most of all it is necessary that the misfire—the one thing in our observation that is most dangerous to the mine or quarry operator—is prevented from occurring and located if it should occur. There are an infinite variety of conditions that may operate as causative factors in producing a misfire.

(To be continued)

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings,	$\frac{1}{4}$ inch down	$\frac{1}{2}$ inch and less	$\frac{3}{4}$ inch and less	$1\frac{1}{2}$ inch and less	$2\frac{1}{2}$ inch and less	3 inch and larger
EASTERN:							
Blakeslee, N. Y.	1.00	1.25	1.10	1.10	1.25	1.25	1.25
Buffalo, N. Y.	1.00	1.25	1.50 per net ton all sizes	1.25	1.25	1.25	1.25
Chaumont, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Cobleskill, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Coldwater, N. Y.	1.35	1.35	1.35	1.35	1.35	1.35	1.35
Eastern Penna.	1.00	1.25	1.25	1.25	1.25	1.25	1.25
Munns, N. Y.	.80	1.25	1.25	1.25	1.25	1.25	1.25
Prospect, N. Y.	1.55	1.55	1.55	1.55	1.55	1.55	1.55
Walford, Pa.	1.55	1.55	1.55	1.55	1.55	1.55	1.55
Watertown, N. Y.	.75	1.20	1.20	1.20	1.20	1.20	1.20
Western New York							
CENTRAL							
Alton, Ill.	1.50		1.50	1.35			
Buffalo, Iowa	1.00		1.35	1.15	1.20	1.20	
Chasco, Ill.	1.30	1.25	1.25	1.25	1.20		
Chicago, Ill.	1.30	1.70	1.30	1.30	1.30		
Dundas, Ont.	1.00	1.35	1.35	1.25	1.10	1.10	
Greencastle, Ind.	1.25	1.10	1.00	.90	.90	.90	
Krause, Columbia and Val-							
meyer, Ill.	1.00@1.30	1.00@1.30	1.00@1.30	1.00@1.30	1.00@1.30	1.30@1.50	
Lannon, Wis.	.65		.95	.85	.85	.85	
Mitchell, Ind.	.80	.80	.80	.80	.80	.80	
Montreal, Canada	.80	1.35	1.05	.95	.90		
Montroe, Ia.		1.50	1.60	1.55	1.45	1.40	
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10		
Southern Illinois	1.35	1.40	1.35	1.30	1.25		
Stolle, Ill. (I. C. R. R.)	1.30		1.35	1.35	1.35	1.35	
Stone City, Iowa	.75		1.40	1.30	1.25		
Toledo, Ohio	1.60	1.70	1.70	1.70	1.60	1.60	
Toronto, Canada	1.90	2.25	2.25	2.25	2.00	2.00	
Waukesha, Wis.							
SOUTHERN:							
Alderson, W. Va.	.75	1.25	1.40	1.25	1.15		
Bridgeport, Texas	1.25	1.40	1.40	1.40	1.25		
Bromide, Okla.	.75	2.00	1.75	1.60	1.50	1.25	
Cartersville, Ga.		2.00	1.25	1.25	1.25		
Chickamauga, Tenn.	80@1.00	.80@1.25		.80@1.00	.80@1.00		
El Paso, Tex.	1.00	1.00	1.00	1.00	1.00		
Ft. Springs, W. Va.	.75	1.25	1.40	1.25	1.20		
Garnet and Tulsa, Okla.	.50	1.60	1.60	1.45	1.45		
Ladds, Ga.			1.40	1.40	1.40		
Morris Spur (near Dallas) Tex.	1.00	1.40	1.40	1.40	1.40	1.25	
WESTERN:							
Atchison, Kans.	.50	1.80	1.80	1.80	1.80	1.80	
Blue Springs and Wymore, Neb.	.25	1.65	1.65	1.55	1.45	1.40	
Cape Girardeau, Mo.	1.35		1.10	1.35	1.10		
Kansas City, Mo.	1.00	1.50	1.50	1.50	1.50	1.40	

Crushed Trap Rock

City or shipping point	Screenings,	$\frac{1}{4}$ inch down	$\frac{1}{2}$ inch and less	$\frac{3}{4}$ inch and less	$1\frac{1}{2}$ inch and less	$2\frac{1}{2}$ inch and less	3 inch and larger
BRANFORD, CONN.							
Bound Brook, N. J.	.60	1.50	1.25	1.15	1.00		
Dresser Jct., Wis.	1.80	2.30	1.90	1.50	1.40		
Duluth, Minn.	1.00	2.25		1.75	2.00		
E. Summit, N. J.	.90@1.00	2.00@2.25	1.75@2.00	1.40@1.50	1.30@1.40		
Eastern Massachusetts							
Eastern New York	.60	1.85	1.40	1.40	1.40	1.40	
Eastern Pennsylvania	.75	1.50	1.30	1.30	1.40	1.40	
New Britain, Middletown, Rocky Hill, Meriden, Conn.	1.25	1.70	1.60	1.50	1.40	1.40	
Oakland, Calif.	.60	1.35@1.45	1.15@1.25		1.05	.95@1.00	
Richmond, Calif.	1.75	1.75	1.75	1.75	1.75		
Spring Valley, Calif.	.50*		1.50*	1.50*	1.50*	1.50*	
Springfield, N. J.	2.00	2.25	2.10	1.85	1.85		
Westfield, Mass.	.60	1.35	1.25	1.10	1.00		

Miscellaneous Crushed Stone

City or shipping point	Screenings,	$\frac{1}{4}$ inch down	$\frac{1}{2}$ inch and less	$\frac{3}{4}$ inch and less	$1\frac{1}{2}$ inch and less	$2\frac{1}{2}$ inch and less	3 inch and larger
Buffalo, N. Y.—Granite.							
Berlin, Utley and Red Granite, Wisc.	.90		1.20	1.00	1.05	1.10	
Columbia, S. C.—Granite.	1.50	1.60	1.40	1.30	1.30		
Dundas, Ont.—Limestone.	.50		2.00@2.50	2.00		1.75@2.00	
Eastern Penna.—Sandstone	1.00	1.35	1.35	1.25	1.10	1.10	
Eastern Penna.—Quartzite	.85	1.55	1.55	1.40	1.35	1.30	
Lithonia, Ga.—Granite	1.20	1.30	1.20	1.20	1.20	1.20	
Lovrville, Wis.—Cr. Granite	1.00		1.50	1.25	1.00	1.00	
Middlebrook, Mo.—Granite	1.35	1.40	1.30		1.20		
San Diego, Calif.	3.00@4.00	2.25@2.50	2.00@2.25			1.50	
Six Falls, S. D.—Granite	.50@.70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	1.25@1.55	

*Cubic yard. †Agri. lime. ||R. R. ballast. \$Flux. \$Rip-rap, a 3-inch and less.

Agricultural Limestone

(Pulverized)

Chaumont, N. Y.—Analysis, 95% CaCO_3 , 1.14% MgCO_3 —Thru 100 mesh; sacks, 4.00; bulk	2.58
Grove City, Pa.—Analysis 94.89% CaCO_3 , 1.50% MgCO_3 ; 60% thru 100 mesh; 45% thru 200 mesh; sacks, 5.00; bulk	3.00
Hillsville, Pa.—Analysis, 90% CaCO_3 , 1.00% MgCO_3 ; 90% thru 100 mesh; sacks, 5.00; bulk	3.50
Jamesville, N. Y.—Analysis, 89.25% CaCO_3 , 2.52% MgCO_3 ; pulverized, bags, 4.00; bulk	2.50
New Castle, Pa.—89% CaCO_3 , 1.4% MgCO_3 ; 75% thru 100 mesh, 84% thru 50 mesh, 100% thru 10 mesh; sacks, 4.75; bulk	3.06
Walford, Pa.—Analysis, 50% thru 100 mesh; 45% in paper; bulk	3.00
Watertown, N. Y.—Analysis, 96% CaCO_3 , 0.2% MgCO_3 ; all pass 100 mesh; bulk, 2.50; sacks	4.00
West Stockbridge, Mass., Danbury, Conn., North Pownal, Vt.—Analysis, 90% CaCO_3 —50% thru 100 mesh; paper bags, 4.25—cloth, 4.75; bulk	3.00
Alton, Ill.—Analysis, 97% CaCO_3 , 0.1% MgCO_3 ; 90% thru 100 mesh	5.00
Bellefontaine, Ohio—Analysis, 90.9% CaCO_3 , 1.15% MgCO_3 ; 45% to 50% thru 100 mesh, 61% to 70% thru 50 mesh; bulk	8.00
Chasco, Ill.—Analysis, 96.12% CaCO_3 , 2.5% MgCO_3 ; 90% thru 100 mesh	2.58
Pulverized limestone	5.00
Detroit, Mich.—Analysis, 88% CaCO_3 , 7% MgCO_3 ; 75% thru 200 mesh, 2.50@4.75—60% thru 100 mesh	1.35
Marblehead, Ohio—Analysis, 83.54% CaCO_3 , 14.92% MgCO_3 ; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; sacks	4.50
Piqua, Ohio—70% thru 100 mesh; bags, 5.00; bulk	3.00
Yellow Springs, Ohio—Analysis, 96.08% CaCO_3 , 63% MgCO_3 ; 32% thru 100 mesh; 95.57%, sacked, 6.00; bulk	4.25
Cape Girardeau, Mo.—Analysis, 93% CaCO_3 , 3.5% MgCO_3 ; 50% thru 100 mesh	1.50
Hot Springs, N. C.—50% thru 100 mesh; sacks, 4.25; bulk	3.00
Knoxville, Tenn.—80% thru 100 mesh	2.70
Linville Falls, N. C.—Analysis, 57% CaCO_3 , 39% MgCO_3 ; 50% thru 100 mesh; bulk	2.75
Mountville, Va.—Analysis, 76.60% CaCO_3 , 22.33% MgCO_3 ; 50% thru 100 mesh; 100% thru 20 mesh; sacks	5.00
Colton, Calif.—Analysis, 95% CaCO_3 , 3% MgCO_3 ; all thru 20 mesh; bulk	4.00
Lemon Cove, Calif.—Analysis, 94.8% CaCO_3 , 0.42% MgCO_3 ; 60% thru 200 mesh; sacks, 5.25; bulk	4.50
Agricultural Limestone	
(Crushed)	
Alton, Ill.—Analysis, 97% CaCO_3 , 0.1% MgCO_3 ; 90% thru 50 mesh	1.50
Bellefontaine, Ohio—Analysis, 61.56% CaCO_3 , 36.24% MgCO_3 ; 3/4 in. to dust, about 20% thru 100 mesh	1.25
Bettendorf, Ia., and Moline, Ill.—97% CaCO_3 , 2% MgCO_3 ; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Buffalo, Ia.—90% thru 4 mesh	1.00
Cape Girardeau, Mo.—Analysis, 93% CaCO_3 , 3.3% MgCO_3 ; 50% thru 4 mesh	1.35
90% thru 4 mesh, cu. yds.	1.35
Chicago, Ill.—Analysis, 53.63% CaCO_3 , 37.51% MgCO_3 ; 90% thru 4 mesh	1.00
Columbia, Ill., near East St. Louis— $\frac{1}{4}$ -in. down	1.25@1.80
Elmhurst, Ill.—Analysis, 35.73% CaCO_3 , 20.69% MgCO_3 ; 50% thru 50 mesh	1.25
Huntington and Bluffton, Ind.—Analysis, 61.56% CaCO_3 , 36.24% MgCO_3 ; about 20% thru 100 mesh	1.25
Greencastle, Ind.—Analysis, 98% CaCO_3 , 50% thru 50 mesh	2.00
Kansas City, Mo.—50% thru 100 mesh	1.50
Krause and Columbia, Ill.—Analysis, 90% CaCO_3 , 90% thru 4 mesh	1.20

(Continued on next page)

Rock Products

Agricultural Limestone

(Continued from preceding page.)

Lathrop, Wis.—Analysis 54% CaCO ₃ , 44% MgCO ₃ ; 99% thru 10 mesh;	2.00
46% thru 60 mesh.....	
Screenings (1/4 in. to dust).....	1.00
Marblehead, O.—Screenings, 40% thru 100 mesh.....	1.25
Milltown, Ind.—Analysis 94.41% CaCO ₃ , 2.95% MgCO ₃ ; 33.6% thru 100 mesh, 40% thru 50 mesh.....	1.25@1.65
Mitchell, Ind.—Analysis, 97.65% CaCO ₃ , 1.76% MgCO ₃ , pulverized limestone.....	1.50
Montrose, Ia.—90% thru 100 mesh.....	1.25
Narbo, Ohio—Analysis 56% CaCO ₃ , 43% MgCO ₃ , limestone screenings, 37% thru 100 mesh; 55% thru 50 mesh; 100% thru 4 mesh.....	1.50@2.00
Ohio (different points), 20% thru 100 mesh; bulk.....	1.25@1.50
River Rouge, Mich.—Analysis, 54% CaCO ₃ , 40% MgCO ₃ ; bulk.....	.80@1.40
Stolle, Ill., near East St. Louis on I. C. R. R.—Thru 1/4 in. mesh.....	1.30
Stone City, Ia.—Analysis, 98% CaCO ₃ ; 50% thru 50 mesh.....	.75
Toledo, Ohio—1/4 in. to dust, 20% thru 100 mesh.....	1.00
Waukesha, Wis.—No. 1 kiln dried, No. 2 Natural.....	2.00
Alderson, W. Virginia—Analysis 90% CaCO ₃ ; 90% thru 50 mesh.....	1.75
Cape Girardeau, Mo.—Analysis, 93% CaCO ₃ , 3.5% MgCO ₃ ; 90% thru 4 mesh.....	2.00
Cartersville, Ga.—Analysis 66% CaCO ₃ , 33% MgCO ₃ ; all passing 10 mesh.....	1.75
Claremont, Va.—Analysis, 92% CaCO ₃ , 2% MgCO ₃ ; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh.....	3.00
Ft. Springs, W. Va.—Analysis, 90% CaCO ₃ ; 90% thru 50 mesh.....	1.25
Ladds, Ga.—50% thru 50 mesh.....	2.00
Garnett, Okla.—Analysis, 80% CaCO ₃ , 3% MgCO ₃ ; 50% thru 50 mesh.....	.50
Kansas City, Mo., Corrigan Sid'g—50% thru 100 mesh; bulk.....	1.80
Tulsa, Okla.—90% thru 4 mesh.....	.50

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va. (damp).....	2.50
Cedarcville and South Vineland, N. J.—Damp, 1.75; dry.....	2.25
Cheshire, Mass.5.00@10.00	
Columbus, Ohio1.50@ 2.00	
Dunbar, Pa. (damp).....	2.50
Falls Creek, Pa.2.25	
Hancock, Md.—Damp, 1.50; dry.....	2.00
Klondike and Pacific, Mo.2.50	
Mapleton, Pa.2.00@ 2.50	
Mapleton Depot, Pa.—Damp, 2.00; dry.....	2.75
Massillon, Ohio3.00	
Michigan City, Ind.50@ .55	
Mineral Ridge, Ohio....2.75@ 3.00	
Montoursville, Pa.1.75	
Oregon, Ill.1.50@ 2.00	
Ottawa, Ill.2.50	
Pittsburgh, Pa.—Dry, 4.00; damp.....	3.00
Rockwood, Mich.2.50@ 3.00	
Round Top, Md.2.25	
Sands, Pa.2.50	
San Francisco, Cal.3.00@ 3.50	
St. Mary's, Pa.2.25	
Thayers, Pa.2.50	
Utica, Ill.1.50	
Zanesville, Ohio2.00@ 2.50	

FOUNDRY SAND:

Albany, N. Y.—Sand blast (dry).....	4.00
Molding fine and brass molding.....	2.50
Molding coarse.....	2.25
Pa.—Core and molding fine 1.50@1.75	
Allentown, Pa.—Molding fine 1.50@1.75	
Arenzville, Ill.—Molding fine 1.50@1.75	
Brass molding2.00	
Beach City, O.—Core, washed and screened2.00@2.50	
Furnace lining2.50@3.00	
Molding fine and coarse.....	2.25@2.50
Cheshire, Mass.—Furnace lining, molding, fine and coarse.....	5.00
Sand blast5.00@8.00	
Stone sawing6.00	
Cleveland, O.—Molding coarse.....	1.50@2.00
Brass molding1.50@2.00	
Molding fine1.50@2.25	
Core1.25@1.50	
Columbus, Ohio—Core50@1.50	
Sand blast3.50@5.00	
Molding fine2.75@3.00	
Molding coarse2.50@3.00	
Brass molding2.50@3.00	

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
Ambridge and So. Heights, Pa.	1.15	1.15	1.15	1.15	.70	.70
Erie, Pa.		.60	.90		1.00	
Farmingdale, N. J.	.48	.48	1.00	1.00	1.20	
Hartford, Conn.	.90		1.25	1.15	1.15	1.15
Leeds Junction, Me.		.50	1.75	1.35	1.35	1.25
Machias, N. Y.	.75	.75	1.50	.85	.85	
Pittsburgh, Pa.	1.15	1.15	1.00	.70	.70	.70
Portland, Maine		.50	1.75		1.35	1.35
Washington, D. C.	.75	.75	1.60	1.40	1.20	1.20
(rewashed, river)						
CENTRAL:						
Alton, Ill.		.85				.90
Anson, Wis.	.50	.40				
Barton, Wis.	.60		.70	.70	.70	.70
Beloit, Wis.		.70			.80	
Chicago, Ill.	1.75@2.23	1.75@2.43				
Cincinnati, Ohio	.70	.65	.90	.90	.90	.96
Columbus, Ohio	.75	.75@1.25	.75@1.25	.75@1.25	.75@1.25	.75@1.25
Des Moines, Iowa	.60	.60	1.70	1.70	1.70	1.70
Earliestad (Flint), Mich.	.70		60-40 sieves, .85; Pebbles, .95			
Eau Claire, Wis.	.50	.45	1.25			.90
Elkhart Lake, Wis.		.50			.60	.60
Ft. Dodge, Ia.		1.22		2.17		
Grand Rapids, Mich.		.50		.80		.70
Hamilton, Ohio		.90			.90	
Hawarden, Ia.		.50			1.60	
Hersey, Mich.	.40	.40			.70	
Indianapolis, Ind.	.60	.60	1.50	.75@1.00	.75@1.00	
Janesville, Wis.		.65@ .75			.65@ .75	
Mason City, Ia.	.70	.60	1.50	1.75	1.65	1.60
Mankato, Minn. (pit run)	.50	.40	.40		1.25	
Milwaukee, Wis.	1.06	1.06	1.26	1.26	1.26	
Minneapolis, Minn.	.35	.35	1.25@1.35	1.25@1.35	1.25	1.25
Moline, Ill.	1.00	1.00	1.60	1.60	1.60	1.60
Riton, Wis.		.60			.80	
St. Louis, Mo., f.o.b. cars	1.20	1.45	1.65	1.45		.45
St. Louis, Mo., deliv. on job	2.05		2.35	2.15		2.10
Summit Grove, Indiana, Ind.	.65@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75	.60@ .75
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.	.55	.55	.80	.80	.80	.80
Winona, Minn.		.40	.40	1.25	1.25	1.10

SOUTHERN:

Birmingham, Ala.	1.48					
Charleston, W. Va.	all sand 1.40					
Estill Springs, Tenn.	1.35	1.15				
Ft. Worth, Tex.	1.50@2.00	1.50@2.00	1.50@2.00	1.50@2.00	1.50@2.00	1.50@2.00
Jackson's Lake, Ala.	.50@ .60	.40@1.00	1.00	.50@1.00	.50@1.00	.50@1.00
Knoxville, Tenn.	.75@1.00			1.00	1.00	1.00
Lake Weir, Fla.		.60				
Macon, Ga.		.50@ .75				
Memphis, Tenn.	1.12	1.12				1.95
N. Martinsville, W. Va.		1.00	1.20			.80
New Orleans, La.		.50			1.00	
Roseland, La.		.25			.85	
WESTERN:						
Grand Rapids, Wyo.	.50	.50	.85	.85	.80	.80
Kansas City, Mo.		(Kaw River sand, car lots, .75 per ton. Missouri River, .85)				
Los Angeles, Calif.	.70	1.20	1.20	1.20	1.10	1.10
Pueblo, Colo.	1.10*	.90*		1.50*		
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.15@1.45	1.15@1.45
San Francisco, Calif.		1.00	1.00@1.20	.85@1.00	.85@1.00	.85@1.00
Seattle, Wash.	1.00*	1.00*	1.00*	1.00*		1.00*
Spring Valley, Calif.	.70	.80	1.40	1.35	1.25	1.25

Bank Run Sand and Gravel

City or shipping point—	Fine sand, 1/10 inch down	Sand, 1/4 inch and less	Gravel, 1/2 inch and less	Gravel, 1 inch and less	Gravel, 1 1/2 inch and less	Gravel, 2 inch and less
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Cape Girardeau, Mo.			River sand, 1.00 per yd. .80 per ton—1.20 washed			
Cherokee, Iowa				.90		
Dudley, Ky. (crushed sand)	1.00	1.00				
East Hartford, Conn.				.65 per cu. yd.		
Elkhart Lake, Wis.	.70	.50			.60	.60
Estill Springs, Tenn.				.50@ .65		.35
Fishers, N. Y.					.50	
Grand Rapids, Mich.					.45 per cu. yd. in pit	
Hamilton, Ohio					.50	
Hartford, Conn.						
Hersey, Mich.						
Indianapolis, Ind.						
Lindsay, Texas						
Montezuma, Ind.						
Pine Bluff, Ark.						
Rochester, N. Y.	.60@ .75	.60@ .75			.50@ .65	.50@ .65
Roseland, La.		.75				
Saginaw, Mich., f.o.b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo.			60% gravel, 40% sand, 1.55			
Summit Grove, Ind.	.50	.50	.50	.50	.50	.50
Waco, Texas						
Winona, Minn.		.80			1.50	
York, Pa.			1.00@1.20 (crushed rock sand)			

* Cubic yard. B Bank. L Lake. || Ballast.

Rock Products

January 27, 1923

Crushed Slag

City or shipping point		$\frac{1}{4}$ inch down	$\frac{1}{2}$ inch and less	$\frac{3}{4}$ inch and less	$\frac{1}{2}$ inch and less	$\frac{2}{3}$ inch and less	3 inch and larger
EASTERN:							
Buffalo, N. Y.	Roofing	2.35	1.35	1.35	1.35	1.35	1.35
E. Canaan, Conn.		4.00	1.00	2.50	1.35	1.25	1.25
Eastern Pennsylvania and Northern New Jersey		2.00	1.20	1.50	1.20	1.20	1.20
Easton, Pa.		2.00	.80	1.25	.90	.85	.80
Erie, Pa.		2.35	1.35	1.35	1.35	1.35	1.35
Emporium, Pa.				1.35	1.35	1.35	1.35
Sharpsville and West Middlesex, Pa.		2.00	1.30	1.70	1.30	1.30	1.30
Western Pennsylvania		2.00	1.25	1.50	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.			All sizes, 1.50, F. O. B. Chicago				
Detroit, Mich.			All sizes, 1.65, F. O. B. Detroit				
Ironton, O.		2.05	1.45	1.80	1.45	1.45	1.45
Steubenville, O.		2.00	1.40	1.70	1.40	1.40	1.40
Toledo, O.		1.75	1.50	1.50	1.50	1.50	1.50
Youngstown, Dover, Hubbard, Leetonia, Struthers, O.		2.00	1.25	1.50	1.25	1.25	1.25
Steubenville, Lowellville and Canton, C.		2.00	1.35	1.60	1.35	1.35	1.35
SOUTHERN:							
Ashland, Ky.			1.55		1.55	1.55	1.55
Birmingham, Ala.		2.05	.80	1.25	1.15	1.10	.95
Ensley, Ala.		2.05	.80	1.25	1.15	1.10	.95
Longdale, Goshen, Glen Wilton & Low Moor,							
Roanoke, Va.		2.50	1.00	1.00	1.25	1.25	1.15
							1.05

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

Finishing Hydrate	Masons' Hydrate	Agricultural Hydrate	Chemical Hydrate	Ground Lime		Lump Lime	
				Bags	Blk.	Bags	Blk.
EASTERN:						2.90	
Adams, Mass.							
Bellefonte, Pa.			10.50\$	10.50\$	10.50\$	9.00	8.50 1.80
Buffalo, N. Y.			12.00		12.00		
Berkeley, R. I.							
Chaumont, N. Y.						2.50	4.00
Lime Ridge, Pa.							5.00
West Rutland, Vt.		13.50	12.00			11.00	3.20
West Stockbridge, Mass.							2.25
Williamsport, Pa.						10.00	6.00
York, Pa. (dealers' prices)		10.50	10.50			10.50	1.65*
Zylonite, Mass.		3.20d	2.90d	7.00			
CENTRAL:							
Delaware, Ohio			10.00	9.50	10.50		
Gibsonville, Ohio		11.50	10.00	10.00		8.00	10.00
Huntington, Ind.			10.00				9.00
Lucky, Ohio		11.50	10.00	10.00			
Marblehead, Ohio			10.00	10.00			9.00 1.60
Marion, Ohio			10.00	10.00			9.00
Mitchell, Ind.						12.00	11.00
Sheboygan, Wis.						10.00	1.60
White Rock, Ohio		11.50				8.00	10.00
Woodville, O. (drls' price)		11.50a	10.00a	10.00a	11.00a		9.00 1.60
SOUTHERN:							
Erin, Tenn.							8.50 1.50
El Paso, Tex.							7.00 1.50
Karo, Va.							7.00 1.30
Knoxville, Tenn.		18.00	11.00@12.00		11.00@12.00	10.00 11.00	8.50 1.50
Ocala and Zuber, Fla.		13.00				13.00	12.00 1.60
Sherwood, Tenn.		12.50	11.00	11.00	11.00	8.50	8.50 1.50
Staunton, Va.						4.50 5.50	8.50 1.35
WESTERN:							
Colton, Calif.				15.00			19.70
Kirtland, N. M.							12.50
San Francisco, Calif.		22.00	22.00	15.00	22.00		16.00 2.15*
Tehachapi, Calif.							13.00
\$100-lb. sacks; *180-lb. net, price per barrel; **180-lb. net, non-returnable metal barrel; \$Paper sacks.							
(a) 50-lb. paper bags; terms, 30 days net; 25¢ per ton or 5¢ per bbl. discount for cash in 10 days from date of invoice. (b) Burlap bags. (c) 200-lb. bbl. (d) 280-lb. bbl. net. (e) 80-lb. paper bags.							

Miscellaneous Sands

(Continued from preceding page)

Delaware, N. J.—Molding fine		2.00					
Molding coarse		1.90					
Brass molding		2.15					
Dunbar, Pa.—Traction, damp		2.50					
Dundee, O.—Glass, core, sand blast, traction		2.50					
Molding fine, brass molding (plus 75¢ for winter loading)		2.00					
Molding coarse (plus 75¢ for winter loading)		1.75					
Eau Claire, Wis.—Core		1.00					
Sand blast		3.25@3.75					
Falls Creek, Pa.—Molding, fine and coarse		1.75					
Sand blast		2.00					
Traction		1.75					
Franklin, Pa.—Core		1.25@1.75					
Furnace lining		2.50					
Molding fine		2.00					
Molding coarse		1.75					
Brass molding		2.00					
Greenville, Ill.—Molding coarse		1.75@2.00					
Joliet, Ill.—No. 2 molding sand and loam for luting purposes; milled		.80					
Bank run		.65					
Kansas City, Mo.—Missouri River core		.80					
Kasota, Minn.—Stone sawing		1.30@1.50					
Klondike, Pacific, Gray Summit, Mo.—Molding fine and coarse		2.00					
Molding fine		2.00					
Mapleton, Pa.—Glass, core, furnace lining, molding fine and coarse; damp		2.75					

(All per 2000 lb.)

Miscellaneous Sands

(Continued)

San Francisco, Cal. (Washed and dried)—Core, molding fine, roofing sand and brass molding	3.00@3.50
Direct from pit	
Furnace lining, molding coarse, sand blast	3.60
Stone sawing, traction	2.30
Thayers, Pa.—Core	2.00
Furnace lining	1.25
Molding fine and coarse	1.25
Traction	2.00
Utica, Ill.—Core	75@1.50
Furnace lining	1.00@1.50
Molding coarse	75@1.50
Stone sawing, roofing sand	1.50@2.50
Sand blast	2.50
Molding fine, traction and brass molding	1.50
Utica, Pa.—Core	1.25@2.25
Molding fine and coarse, traction, brass molding	2.00
Warwick, Ohio—Core, furnace lining, molding coarse; green, 2.00; dry	2.50
Molding fine, traction, dry	2.50
Brass molding fine	2.25
Zanesville, Ohio—Core	2.00
Furnace lining	6.00
Molding fine	1.75
Molding coarse	1.75
Brass molding	1.75@2.00

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Ground talc (20-50 mesh), bags	10.00
Ground talc (150-200 mesh), bags	12.00
Cubes	50.00
Blanks (per lb.)	.07
Chatsworth, Ga.—Grinding	6.00
Ground talc (150-200 mesh); bags	10.00
Pencils and steel workers' crayons (gross)	1.50@2.50
Chester, Vt.—Crude talc	5.00
Ground talc (150-200 mesh), bulk	6.50@8.50
Emeryville, N. Y.—200-325 mesh; bags	14.75
Glendale, Calif.—Ground talc (150-200 mesh)	16.00@30.00
(Bags extra)	
Ground talc (300-500 mesh)	13.50@15.50
200 mesh	13.50@14.50
Haileboro, N. Y.—Ground talc (150-250 mesh), bags	18.00
Henry, Va.—Crude talc (Clump mine run) per 2000-lb. ton	2.75@3.50
Ground talc (20-50 mesh), bags	8.75@10.00
(150-200 mesh), bags	9.75@12.50
Los Angeles, Calif.—Ground talc (200 mesh) (includ. bags)	16.00@20.00
Mertztown, Pa.—Ground talc (20-50 mesh); bulk, 5.00; bags	6.00
(150-200 mesh); bulk, 7.00; bags	8.00
Natural Bridge, N. Y.—Ground talc (150-200 mesh) bags	12.00@13.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk	8.50@10.00
(Bags extra)	
Ground talc (150-200 mesh), bulk	10.00@22.00
(Bags extra)	
Vermont—Ground talc (20-50 mesh); bags	7.50@10.00
Ground talc (150-200 mesh); bags	8.50@13.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk	7.50
(Bags 1.00 extra)	
Ground talc (150-200 mesh), bulk	9.00@14.00
(Bags 1.00 extra)	
Pencils and steel workers' crayons, per gross	1.20@2.00

Rock Phosphate

Raw Rock

Per 2240-lb. Ton	
Centerville, Tenn.—B.P.L. 72% to 75% 6.00@8.50	
B.P.L. 65%	6.00
Gordonsburg, Tenn.—B.P.L. 68% 72% 4.50@5.00	
Tennessee—F. o. b. mines, long tons, unground Tenn. brown rock, 72% B. P. L.	7.00
Mt. Pleasant, Tenn.—Analysis, .65-.70% B.P.L. (2000 lb.)	6.00@6.50
Paris, Idaho.—2000 lb. mine run, B.P.L. 70%	3.60

(Continued on next page)

Rock Products

Roofing Slate

The following prices are per square (100 sq. ft.) for Pennsylvania Blue-Gray Roofing Slate, f. o. b. cars quarries:

Sizes	Genuine Bangor, Washington Big Bed, Franklin Big Bed	Genuine Albion	Slatington Small Bed	Genuine Bangor Ribbon
Mediums	\$10.20	\$8.40	\$8.10	\$7.50
24x12	10.20	8.40	8.10	7.50
24x14	10.80	8.70	8.40	7.80
22x12	10.80	8.70	8.40	7.80
22x11	12.60	9.00	8.70	8.10
20x12	12.60	9.00	8.70	8.10
20x10	12.60	9.00	8.70	8.10
18x10	12.60	9.00	8.70	8.10
18x9	12.60	9.00	8.70	8.10
16x10	12.60	8.70	8.40	7.80
16x9	12.60	8.70	8.40	7.80
16x8	12.60	8.70	8.40	7.80
18x12	12.60	9.00	8.70	8.10
16x12	12.60	8.70	8.40	7.80
14x10	11.10	8.40	8.10	7.50
14x8	11.10	8.40	8.10	7.50
14x 7 to 12x6	9.30	8.10	7.50	7.50
24x12	\$ 8.10	\$8.10	\$7.20	\$5.75
22x11	8.40	8.40	7.50	5.75
Other sizes	8.70	8.70	7.80	5.75

For less than carload lots of 20 squares or under, 10% additional charge will be made.

(Continued from preceding page)

Ground Rock

Wales, Tenn.—B.P.L. 70%	7.75
Per 2000-lb. Ton	
Barton, Fla.—Analysis, 50% to 65% B.P.L.	3.50@8.00
Centerville, Tenn.—B.P.L., 60-65%	5.00@6.00
B.P.L. 75% (brown rock)	12.00
Columbia, Tenn.—B.P.L. 68% to 72% B.P.L. 65% (90% thru 200 mesh) bulk	5.50
Montpelier, Idaho — Analysis, 72% B.P.L., crushed and dried	3.75
Mt. Pleasant, Tenn.—B.P.L. 65%	5.50@6.00

Florida Soft Phosphate

Raw Land Pebble

Per Ton

Florida—F. o. b. mines, long ton, 68/66% B.P.L.	3.00
68% (min.)	3.25
70% (min.)	3.50
Jacksonville (Fla.) District	10.00@12.00

Ground Land Pebble

Per Ton

Jacksonville (Fla.) District	14.00
Add 2.50 for sacks.	
Morristown, Fla.—26% phos. acid.	16.00

Mt. Pleasant, Tenn.—65-70% B.P.L. 5.00@6.00

Special Aggregates

Prices are per ton f. o. b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco chips
Chicago, Ill.—Terrazzo chips, in sacks f.o.b. quarries		17.50
Deerfield, Md.—Green; bulk	7.00	7.00
Easton, Pa.—Evergreen, creme green and royal green marble	10.00@16.00	14.00@20.00
Slate granules	7.00@ 7.50	
Granville, N. Y.—Red slate granules	7.50	
Ingomar, Ohio	10.00@12.00	10.00@25.00

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricul- tural Gypsum	Stucco* and Calcined Gypsum	Gauging Plaster	Wood Fiber	White\$ Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	Plaster Board 1/4x32x36" Weight 1500 lb. Per M Sq. Ft.	Wallboard, 1/4x32x36" Weight 1850 lb. Per M Sq. Ft.	Lengths 6'-10', 1850 lb. Per M Sq. Ft.
Douglas, Ariz.	6.00	6.00	13.00						21.30	20.00	20.00	30.00	
Fort Dodge, Iowa	3.00	3.50	6.00	8.00	10.00	10.50	20.00				20.00	11.00	
Garbutt, N. Y.			6.00	8.00	10.00	10.00		7.00			20.00	11.00	
Grand Rapids, Mich.	3.00		5.00	10.00	10.00	10.00			31.00		19.75	20.00	30.00
Hanover, Mont.	4.50		6.00	10.00		10.50							
Mound House, Nev.		8.50	6.50	10.50@11.50									
Oakfield, N. Y.	3.00	4.00	6.00	8.00	10.00	10.00	20.20	7.00+	30.75	21.00	19.375	20.00	30.00
Rapid City, S. D.	4.00		10.00	12.00	12.50				33.75				
Winnipeg, Man.	5.50	5.50	7.00	13.50	15.00	15.00					28.50		35.00

NOTE—Returnable Jute Bags, 15¢ each, \$3.00 per ton; Paper Bags, \$1.00 per ton extra.

*Shipment in bulk 25¢ per ton less; \$Bond plaster \$1.50 per ton additional; +Sanded Wood Fiber \$2.50 per ton additional; \$White Moulding 50¢ per ton additional; ||Bulk; (a) Includes sacks.

Redfield, Mass.	15.00
Rives Junction, Mich.	11.00
Saginaw, Mich.	11.00
San Antonio, Texas—Common	15.00
South Dayton, Ohio	12.50@13.50
Syracuse, N. Y. (delivered at job)	18.00
f.o.b. cars	16.00
Washington, D. C.	14.50

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton Finishing	Common
Atlanta, Ga.	23.00	13.00
Baltimore, Md.	21.00	15.75
Cincinnati, Ohio	14.80	12.30
Chicago, Ill.	20.00	18.00
Dallas, Tex.	25.00	
Denver, Colo.	24.00	
Detroit, Mich.	18.00	13.25
Kansas City, Mo.	25.60	24.00
Minneapolis, Minn. (white)	25.50	22.00
Montreal, Que.	21.00	21.00
New Orleans, La.		17.25
New York, N. Y.	16.80	13.10
Philadelphia, Pa.	15.50	14.50
St. Louis, Mo.	21.20	19.00
San Francisco, Calif.	22.00	16.00
Seattle, Wash. (paper sacks)	24.00	

Lump per 180-lb. Barrel (net)

	Finishing	Common
Atlanta, Ga.	2.25†	1.85†
Baltimore, Md.		15.00†
Cincinnati, Ohio		10.75†
Chicago, Ill.	1.50†	1.40†
Dallas, Tex.	15.00†	11.00†
Denver, Colo.		2.70†
Kansas City, Mo.	2.34†	2.20†
Minneapolis, Minn.	1.70†	1.40†
Montreal	15.00†	11.00†
New Orleans, La.	2.40†	
New York, N. Y.	3.63 1/2*	2.75@3.13 1/2*
Philadelphia, Pa.	13.00‡	12.00‡
St. Louis, Mo.		17.75‡
San Francisco, Calif.		1.75‡
Seattle, Wash.	2.80†	

*Per 280 lb. bbl. (net). †Per ton. Refund of 10¢ per bbl. Minneapolis quotes brown common lump lime; Kelly Island white is \$1.55, Sheboygan \$1.45. New York quotes hydrated lime "on cars" in paper sacks; lump lime "alongside dealers' docks" or "on cars."

Portland Cement

Current prices per barrel in carload lots, f. o. b. cars, without bags.

Atlanta, Ga.	2.80
Boston, Mass.	3.03
Cedar Rapids, Iowa	2.33
Cincinnati, Ohio	2.39
Chicago, Ill.	2.05
Dallas, Tex.	2.25
Davenport, Iowa	2.28
Denver, Colo.	2.65
Detroit, Mich.	2.33
Duluth, Minn.	2.04
Indianapolis, Ind.	2.26
Kansas City, Mo.	2.45
Los Angeles, Calif.	3.00
Milwaukee, Wis.	2.22
Minneapolis, Minn.	2.29
Montreal, Can. (sacks 20c extra)	2.40
New Orleans, La.	2.83
New York, N. Y.	2.70
Phoenix, Ariz.	3.70
Pittsburgh, Pa.	2.14
Portland, Ore.	3.05
St. Louis, Mo.	2.35
St. Paul, Minn.	2.29
Toledo, Ohio	2.33
Seattle, Wash.	2.90

NOTE—Add 40¢ per bbl. for bags.

News of All the Industry

Incorporations

The Tensas Gravel Co. has been incorporated at Wilmington, Del., for \$1,100,000.

The Bogue Chitto Gravel Co., Franklinton, La., has been incorporated for \$20,000.

The Kiski Lime Products Co., Wilmington, Del., has been incorporated for \$50,000.

The Kenova Sand and Gravel Co., Kenova, W. Va., has been incorporated for \$100,000.

The Atlas Rock Co., Jacksonville, Fla., has been incorporated for \$50,000. O. N. Lundblom, secretary-treasurer.

The Trinity Gravel Co., Dallas, Texas, has been incorporated for \$300,000, by D. G. Smith, D. S. Hartson and L. S. Brotherton.

The Plymouth Quarries, Plymouth, Mass., has been incorporated for \$50,000. The representative is H. S. Gould, 37 Wall street, New York.

The Great Western Portland Cement Co., Kansas City, Mo., has been incorporated for \$900,000, by W. Volker, C. F. Swanson and A. L. Quant.

Gypsum

The National Gypsum Co.'s plant at Murfreesboro, Ark., is operating at top speed, due to an unusual amount of orders for its product. Several thousand dollars worth of machinery will be purchased, a large force of men employed and shipments of several cars of gypsum a week will be begun.

Quarries

The Wholesale Granite Co., Atlanta, Ga., will erect a building 50x150 ft.

The Arvonia-Buckingham Slate Co., Richmond, Va., has increased its capital to \$100,000.

The St. Louis Asphalt Co., St. Louis, Mo., recently suffered fire loss of \$10,000. W. M. Stringer is president.

The Alabama Rock Asphalt Co., recently organized in Florence, Ala., will develop a 700-acre deposit near Mergerum.

The Hydro-Stone Co., Sioux City, Ia., has been awarded a \$500,000 contract to furnish artificial stone for the new Paddock hotel at Beatrice, Neb.

Bald Knob, Ark.—The Missouri Pacific stone quarry near here has been re-opened. It is planned to increase the crew as the operators have several large contracts for buildings.

The Rock Asphalt Co. of America has been organized at Bowling Green, Ky., and will develop deposits in the western part of the state. W. E. Massey, Louisville, Ky., is president, and F. R. Brents, Woodbury, Tenn., is secretary.

The Linwood Cement Co., Davenport, Ia., has been awarded the contract of furnishing \$23,000 worth of stone for the Central Engineering Co., to be used in building a road past New Liberty, Ia. In all 18,000 yd. of stone will be delivered.

Lexington, N. C.—About 10 carloads of crushed stone per day is being shipped from the Bell Mountain quarries near Newsom. Preparations are being made by the company to considerably increase its present output and install a well drill equipped to drill through rock; its granite bluff is about 140 ft. high.

Lime

The Peerless White Lime Co., St. Louis, Mo., has increased its capital stock from \$15,000 to \$175,000.

San Andreas, Calif.—William McNider and a

party of men interested in the big cement project at the Kentucky house were in San Andreas recently in the interest of the project. Large concessions of land have been secured at Cave City, which are being developed to ascertain its possibilities for cement production.

Cement

Sam W. Kendall and others will, it is said, establish a cement plant at Florence, Ala.

The Texas Cement Plaster Co., Hanlin, Texas, has increased its capital stock from \$64,000 to \$500,000.

The Huron Portland Cement Co., Detroit, Mich., has increased its capital stock from \$200,000 to \$4,000,000.

Stockton, Calif.—The National Cement Co., Edgewood, Calif., will install a mill and develop local asbestos mines.

The Dewey Portland Cement Co., Dewey, Okla., has distributed among its 200 employees \$16,000 in bonus checks.

W. T. Archer, T. Harris and others contemplate erecting a cement and lime plant costing \$500,000 at Tuscaloosa, Ala.

The Alpha Portland Cement Co., Easton, Pa., has acquired the plant of the Continental Portland Cement Co., at Continental, Mo., and plan to enlarge the plant. G. S. Brown is president.

The New York and New England Cement and Lime Co., near Hudson, N. Y., will make its yearly repairs in record time. The plant will be shut down for two weeks, which is the shortest shutdown in its history.

The Olympic Portland Cement Co., Bellingham, Wash., has resumed operations at its mill. For the next two months the factory will run at half capacity and thereafter at full blast. The company is also opening a new quarry at Balfour.

The Nebraska Cement Co., Superior, Neb., which has employed over 400 men, has practically shut down for the winter, as all orders have been filled and there is very little work. The plant averages about 15 carloads of cement daily.

The Acme Cement Plaster Co., St. Louis, Mo., has increased its capital stock from \$1,000,000 to \$2,000,000 through the declaration of a 100 per cent stock dividend. The only class of security now outstanding is common stock. Cash dividends paid during 1922 amounted to 16 per cent.

Salem, Ore.—A rate of 17½ cents per 100-lb. on cement shipped from Webak, to Portland, Ore., over the O. W. R. & N., has been granted by the Oregon public service commission. Minimum carload weight was fixed at 80,000 lb. The order will not affect intermediate points. As a result, a cement plant will be erected at Webak costing approximately \$1,000,000.

Sand and Gravel

The Ohio River Sand Co., Louisville, Ky., has increased its capital stock to \$360,000.

The Greenville Stone and Gravel Co., Williford, Ark., will reopen its quarry and gravel works in the spring.

The Eastern Illinois Gravel Co., Danville, Ill., has filed an amendment to its charter increasing its capital stock from \$100,000 to \$125,000.

The Detroit Gravel Co. has been incorporated in Detroit, Mich., at \$1,250,000, and will handle sand, gravel and crushed stone. Incorporators are F. D. Copnock, Greenville, Ohio; C. E. Patty and Guy C. Baker.

The Western Sand and Gravel Co., Spring Valley, Ill., has added to its equipment a new electrical shovel. The entire plant, which includes conveyors, loaders and crushers, is now operated by electricity.

Oklahoma City, Okla.—The Grand River Sand and Gravel Co., Fort Gibson, has leased a portion of the bed of the Arkansas river from the School Land Commission. The company has a contract to furnish a large part of the sand and gravel to be used in the water works project at Tulsa.

Concrete Products

The Concrete Pipe Co., Seattle, Wash., will erect a general office building.

Walter Van Horn, St. Clairsville, Ohio, will begin the erection of a cement block and pipe factory.

The Massey Concrete Products Co., Chicago, Ill., will, it is said, establish a branch in Montgomery, Ala., where a \$50,000 building is being erected.

The Concrete Pipe Co., Kelso, Wash., will install a large plant near Freeport, in connection with the Long-Bell Lumber Co. development at Longview.

The Frazier Drain Tile Co., Bluffton, Ind., has been incorporated for \$75,000, to manufacture tile and blocks, by L. M. Frazier, W. H. Frazier and Etta V. Frazier.

Dealers

M. Redmond & Co., Kelso, Wash., has been incorporated for \$10,000, to deal in building materials.

The Erl-Kidder Co., dealers in building supplies, Royal Oak, Mich., has increased its capital stock from \$20,000 to \$150,000.

The Lucas Brick Co., Portland, Me., has been incorporated for \$100,000, to manufacture and deal in clay products, etc. M. M. Lucas is president and treasurer.

The Cornish Co., Hartsville, S. C., has been incorporated for \$25,000, to deal in building materials. C. K. Dunlap, president; J. G. Cornish, secretary and treasurer.

The Egbert Concrete Products Co., Brooklyn, N. Y., dealers in cement blocks, are erecting another plant to supply the demand for building blocks in expectation of a busy spring.

The Material and Fuel Co., Danville, Ill., has been incorporated for \$20,000, and will deal in coal, sand, gravel, etc. Incorporators are R. McCalman, J. W. Hunter and O. Shelato.

Leavitt-Richardson, Inc., Portland, Me., has been incorporated for \$10,000, to manufacture and deal in all kinds of building material. F. G. Leavitt is president; R. M. Richardson, treasurer.

The William H. Devos Co., Inc., Milwaukee, Wis., has been incorporated for \$45,000, to deal in cement blocks and other building material. Incorporators are W. H. Devos, J. A. Devos and A. W. Devos.

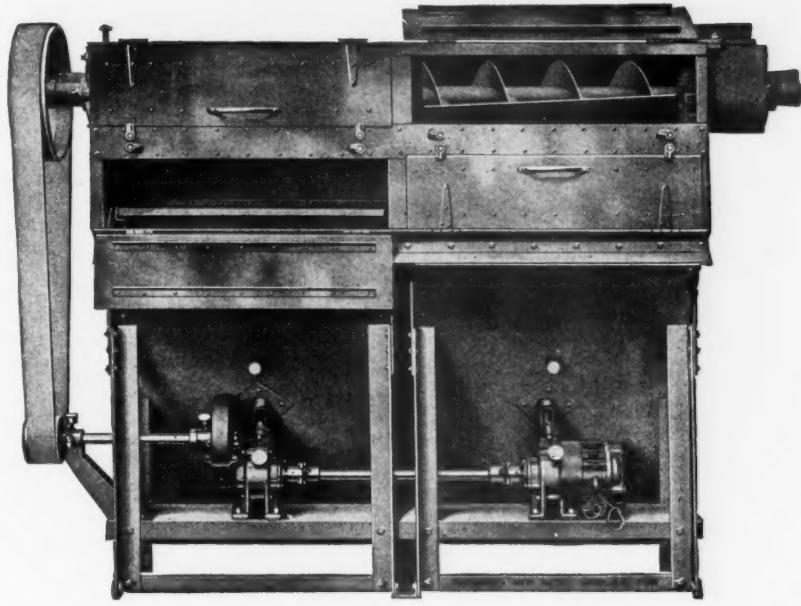
Manufacturers

The Easton Car and Construction Co. announces the opening of a new office in Harrisburg. This office will be under the personal direction of George D. Fraunfelder.

The Directors of Gifford-Wood Co., Hudson, N. Y., at a recent meeting appointed Joseph A. Boucher as sales manager. For more than 15 years Mr. Boucher has served this company and his promotion has been well earned. He spent his first few years in the company's offices at Hudson, N. Y., much of his time being devoted to engineering work. He eventually joined the sales force and was later assigned to the New York office. Mr. Boucher will be located at the main office at Hudson, N. Y.

A Correction—In the January 13 issue of Rock Products, on page 11, it was inadvertently stated that Symons disc crushers "now enable you to produce uniform size stone or gravel for road top dressing or concrete anywhere desired WITHOUT loss of fines." Of course, it should have read, "with LESS loss of fines."

STURTEVANT



MOTO-VIBRO SCREEN INEXPENSIVE BUT NOT CHEAP

It costs only about $\frac{1}{2}$ as much as others but is better in quality, design, accessibility, durability, efficiency, capacity and vibration.

Why? Because—All unnecessary complications, delicate adjustments, auxiliaries, dangerous tension and destructive flexing have been eliminated.

Stripped of trouble, it is unique in effectiveness.

The "outs" of competitors do not exist in the Moto-Vibro.

Forty years of screening experience has made this possible.

This is not an idle boast—it is a fact, easily proven. Try it against any competitor—you are the judge.

WE SELL ON APPROVAL

The Moto-Vibro Screen is of Unit construction, one, two, or three screens per Unit. Operated electrically or by belt it is suitable for all requirements. It vibrates uniformly over entire screen area with no dead spots.

Eighteen hundred vibrations per minute of stinging intensity but of small amplitude. Noiseless, durable, compact and self contained.

STURTEVANT MILL CO. HARRISON SQUARE Boston, Mass.

THE QUARRY MANUAL

¶ The convention of the National Crushed Stone Association, held in Chicago, January 15-17, was the most successful one in its history. The industry was represented by men from all corners of the United States and Canada.

¶ The program of the convention was the greatest because it was specifically designed to take in all phases of quarry operation and management and to be made into a Quarry Manual—a long-felt want in the quarry industry.

¶ The National Crushed Stone Association authorized ROCK PRODUCTS to publish the entire transactions, including valuable papers by experts in the industry and all discussion.

¶ This is being *compiled, edited and indexed* into manual form and will be printed in the March 10th issue of ROCK PRODUCTS—the only handbook in the quarry industry and the beginning of permanent quarry literature. It will likely contain over 200 pages of text!

¶ This issue will have the greatest coverage in the industry. Orders for extra copies are coming in from such men as H. E. Bair, general manager of the France Stone Co., Toledo, Ohio, for 25. W. Scott Eames, general manager of the New Haven Trap Rock Co., New Haven, Conn., orders 12. Its proved value to such men is the criterion of its function in the industry.

¶ Quarry owners and operators will do well to get in their orders now for extra copies for their plant foremen and superintendents.

¶ Manufacturers of quarry machinery, equipment and materials are thus offered the exceptional opportunity to incorporate in this Manual a veritable encyclopedia of machinery, equipment and materials. It will not only enhance the value of the Manual, but it is a most excellent means of placing the message of your equipment before the quarry industry in permanent form and under the best possible auspices.

¶ Regular advertising rates will be in effect. Make your space reservation now.

Rock Products

542 South Dearborn Street, Chicago

Member A. B. C.

Member A. B. P.



15,000 Square Feet of ARMCO INGOT IRON



The Keystone Gravel Company of Dayton, Ohio, have used 15,000 square feet of ARMCO Ingot Iron sheets for roofing and siding on their plant buildings.

In the manufacture of ARMCO Ingot Iron the raw materials are carefully selected and the manufacturing processes are checked by chemists all the way through. Every sheet of this commercially pure iron is uniform, which accounts for its universal satisfaction under service conditions.

The longer service which you will receive from this long-lasting iron makes it the most economical ferrous metal you can use.

If you have a sheet metal problem requiring special attention, our Research Laboratories are at your service.

**THE AMERICAN ROLLING MILL CO.
MIDDLETOWN, OHIO**

Buyers' Directory of the Rock Products Industry

Classified Directory of Advertisers in Rock Products

AERIAL TRAMWAYS

Interstate Equip. Co., New York, N. Y.

AUTOMATIC WEIGHERS

Richardson Scale Co., Passaic, N. J.
Schaffer Eng. & Equipment Co., Pittsburgh, Pa.

BAGS AND BAG MACHINERY

Jaite Co., The, Jaite, Ohio

BELTING

Robins Conveying Belt Co., New York City, N. Y.

BINS

Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill. (storage).

BIN GATES

Allis-Calmers Mfg. Co., Milwaukee, Wis.
Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.
Sturtevant Mill Co., Boston, Mass.
Traylor Eng. & Mfg. Co., Allentown, Pa.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

BLASTING SUPPLIES

Hercules Powder Co., Wilmington, Del.

BOILERS, WASTE HEAT

Edge Moor Iron Co., Edge Moor, Del.
Freeman Mfg. Co., Racine, Wis.

BUCKETS—Elevator

Austin Mfg. Co., Chicago, Ill.
Brown Hoisting Machinery Co., Cleveland, Ohio.
Hendrick Mfg. Co., Carbondale, Pa.
Link-Belt Co., Chicago, Ill.
Orton & Steinbrenner, Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.

BUCKETS, GRAB

Brown Hoisting Machinery Co., Cleveland, Ohio.
McMyler Interstate Co., Cleveland, Ohio.

CABLEWAYS

Interstate Equip. Co., New York, N. Y.
Link-Belt Co., Chicago, Ill.

CALCINING MACHINERY

Atlas Car & Mfg. Co., Cleveland, Ohio.
Butterworth & Lowe, Grand Rapids, Mich.

CARS—Quarry and Industrial

Atlas Car & Mfg. Co., Cleveland, Ohio.
Watt Mining Car Wheel Co., Barnesville, Ohio.

CAR PULLERS

Link-Belt Co., Chicago, Ill.
Mining Machine Co., Mountville, Pa.
Weller Mfg. Co., Chicago, Ill.

CEMENT MACHINERY

Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City.

CHAIN

Carroll Chain Co., Columbus, Ohio.
Moore & Moore, Inc., Reading, Pa.
Morse Chain Co., Ithaca, N. Y.

CLUTCHES

Webster Mfg. Co., Chicago, Ill.

CONVEYORS AND ELEVATORS

Jeffrey Mfg. Co., Columbus, Ohio.
Kennedy-Van Saun Mfg. & Eng. Corp., New York City.
Link-Belt Co., Chicago, Ill.
Smith Eng. Works, Milwaukee, Wis.
Robins Conveying Belt Co., New York City.
Sturtevant Mill Co., Boston, Mass.
Universal Road Mach. Co., Kingston, N. Y.

Webster Mfg. Co., Chicago, Ill.

CRANES—Crawling Tractor

Industrial Works, Bay City, Mich.

CRANES—Locomotive Gantry

Brown Hoisting Machinery Co., The, Cleveland, Ohio.
Byers Mach. Co., The, Ravenna, Ohio.
Erie Steam Shovel Co., Erie, Pa.
Industrial Works, Bay City, Mich.
Koehring Co., Milwaukee, Wis.
Link-Belt Co., Chicago, Ill.
McMyler-Interstate Co., Cleveland, Ohio.
Ohio Locomotive Crane Co., Bucyrus, Ohio.
Orton & Steinbrenner, Chicago, Ill.
Osgood Co., The, Marion, Ohio.

CRUSHERS AND PULVERIZERS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

American Pulverizer Co., St. Louis, Mo.

Austin Mfg. Co., Chicago, Ill.
Austin-Western Road Mach. Co., Chicago, Ill.

Buchanan Co., Inc., C. G., New York, N. Y.

Butterworth & Lowe, Grand Rapids, Mich.

Fuller-Lehigh Co., Fullerton, Pa.
Good Roads Machinery Co., Kennett Square, Pa.

Jeffrey Mfg. Co., Columbus, Ohio.
K. B. Pulverizer Co., New York, N. Y.

Kennedy-Van Saun Mfg. & Eng. Corp., New York, N. Y.

Kent Mill Co., Brooklyn, N. Y.

Lewistown Fdry. & Mach. Co., Lewistown, Pa.

McLanahan-Stone Mach. Co., Hollidaysburg, Pa.

Morgan Engineering Co., Alliance, Ohio.
Monson Mill Machinery Co., Utica, N. Y.
New Holland Machine Co., New Holland, Pa.

Pennsylvania Crusher Co., Philadelphia, Pa.

Raymond Bros. Impact Pulv. Co., Chicago, Ill.

Smith Eng. Works, Milwaukee, Wis.

Sturtevant Mill Co., Boston, Mass.

Traylor Eng. & Mfg. Co., Allentown, Pa.

Universal Crusher Co., Cedar Rapids, Iowa.

Universal Road Mach. Co., Kingston, N. Y.

Webb City and Carterville Fdy. and Mack Co., Webb City, Mo.
Williams Pat. Crush. & Pulv. Co., Chicago, Ill.

CRUSHER REPAIRS—Manganese Steel

American Manganese Steel Co., Chicago Heights, Ill.

CLUTCHES

Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

DERRICKS

American Hoist & Derrick Co., St. Paul, Minn.
Mundy Hoisting Engine Co., J. S., Newark, N. J.

DIPPER TEETH

American Manganese Steel Co., Chicago Heights, Ill.

DRILLS

Sanderson Cyclone Drill Co., Orrville, Ohio.

DRILLERS

Pennsylvania Drilling Co., Pittsburgh, Pa.

DRYERS

American Process Co., New York City.
Fuller-Lehigh Co., Fullerton, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

DUST COLLECTING SYSTEMS

Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DYNAMITE

Hercules Powder Co., Wilmington, Del.

ENGINES—Steam

Morris Mach. Works, Baldwinsville, N. Y.

ENGINEERS

Buckbee Co., J. C., Chicago, Ill.
Hunt, R. W., & Co., Chicago, Ill.
Richard K. Meade & Co., Baltimore, Md.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Webster Mfg. Co., Chicago, Ill.

EXCAVATORS

Brown Hoisting Machinery Co., Cleveland, Ohio.
Erie Steam Shovel Co., Erie, Pa.
Koehring Co., Milwaukee, Wis.

EXCAVATORS—Dragline Cableway
Link-Belt Co., Chicago, Ill.
Sauerman Bros., Chicago, Ill.

EXPLOSIVES

Hercules Powder Co., Wilmington, Del.

GAS PRODUCERS

Morgan Construction Co., Worcester, Mass.

R. D. Wood & Co., Philadelphia, Pa.

GEARS

Cleveland Worm & Gear Co., Cleveland, Ohio.
Link-Belt Co., Chicago, Ill.

GLASS SAND EQUIPMENT

Lewistown Fdy. & Mach. Co., Lewistown, Pa.

(Continued on page 68)



The Great Wall of China

To stop the inroads of the barbarians of Northern China, Chin Huang-Ti in 214 B.C. began building the Great Wall of China.

Brawn was nearly the only force at his command to accomplish this enormous task. He gathered together an army of 300,000 men and set them at laboriously hewing out the stone for the faces of the wall and gathering rubble to fill in the inside.

Generation after generation of Chinamen toiled on the structure. Another dynasty arose and continued the work. Even as they labored, they were often called upon to repulse the attack of some hostile horde. The Great Wall still stands, one of the most remarkable achievements of human strength and persistence.

The cost of time and labor was immaterial to the Chinese Emperor, Chin Huang-Ti, but to the modern road builder, contractor, quarryman or

miner, these two factors are of great importance.

Explosives have been one of the principal factors in reducing the stupendous production costs of by-gone ages, but the necessity for eliminating waste has become so urgent that even dynamite, perhaps the greatest labor-saving invention of all history, must now be scientifically selected. It is possible to reduce blasting costs with Hercules Special No. 1 on work for which it is suited. This explosive contains about $\frac{1}{3}$ more cartridges per case than ordinary dynamite and usually replaces 40% dynamite, cartridge for cartridge, at a saving of 25% or more in blasting costs.

Our booklets, "Volume vs Weight" and "Eliminating Waste in Blasting," tell why Hercules Special No. 1 and Special No. 2 are so economical. Write to our Advertising Department, 945 King Street, Wilmington, Delaware, for free copies of these booklets.

HERCULES POWDER COMPANY

Allentown, Pa.
Birmingham, Ala.
Buffalo, N. Y.
Chattanooga, Tenn.

Chicago, Ill.
Denver, Colo.
Duluth, Minn.
Los Angeles, Calif.

Hazleton, Pa.
Huntington, W. Va.
Joplin, Mo.



Louisville, Ky.
New York City
Norristown, Pa.
Pittsburg, Kan.

Pittsburgh, Pa.
Pottsville, Pa.
St. Louis, Mo.
Pittsburg, Kan.

Salt Lake City, Utah
San Francisco, Calif.
Wilkesbarre, Pa.
Wilmington, Del.

Buyers' Directory of the Rock Products Industry

Classified Directory of Advertisers in Rock Products

(Continued from page 66)

GRINDING MILLS

Munson Mill Machinery Co., Utica, N. Y.

GRIZZLIES

Robins Conveying Belt Co., New York City.

HOISTS

American Hoist & Derrick Co., St. Paul, Minn.
Austin Mfg. Co., Chicago, Ill.
Link-Belt Co., Chicago, Ill.
Thomas Elevator Co., Chicago, Ill.
Vulcan Iron Works, Wilkes-Barre, Pa.
Weller Mfg. Co., Chicago, Ill.

HOSE

Robins Conveying Belt Co., New York City, N. Y.

HYDRATING MACHINERY

Atlas Car & Mfg. Co., Cleveland, Ohio
Kritzer Co., The, Chicago, Ill.
Miscampbell, H., Duluth, Minn.
Schaffer Eng. & Equip. Co., Pittsburgh, Pa.

Toepfer & Sons Co., W., Milwaukee, Wis.

HYDRAULIC DREDGES

Morris Machine Works, Baldwinsville, N. Y.

INGOT IRON

American Rolling Mill Co., Middletown, Ohio.

INSULATION

Celite Products Co., Chicago, Ill.

LIME HANDLING EQUIPMENT

Link-Belt Co., Chicago, Ill.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

LIME KILNS

Steacy-Schmidt Mfg. Co., York, Pa.
Vulcan Iron Works, Wilkes-Barre, Pa.

LOADERS AND UNLOADERS

Brown Hoisting Machinery Co., Cleveland, Ohio.
Erie Steam Shovel Co., Erie, Pa.
Jeffrey Mfg. Co., Columbus, Ohio.
Link-Belt Co., Chicago, Ill.
Orton & Steinbrenner, Chicago, Ill.

LOCOMOTIVES

Baldwin Locomotive Works, The, Philadelphia, Pa.
Fate-Root-Heath Co., Plymouth, Ohio.
Hadfield-Penfield Steel Co., Bucyrus, Ohio.
Jeffrey Mfg. Co., Columbus, Ohio.
Lima Locomotive Works, New York, N. Y.

Vulcan Iron Works, Wilkes-Barre, Pa.
Whitcomb Co., Geo. D., Rochelle, Ill.

MANGANESE STEEL REPAIRS

Hadfield-Penfield Steel Co., Bucyrus, Ohio
Moore & Moore, Inc., Reading, Pa.

MOTOR TRUCKS

Traylor Eng. & Mfg. Co., Allentown, Pa.

PAINT AND COATINGS

Williams, C. K., & Co., Eaton, Pa.

PERFORATED METALS

Cross Eng. Co., Carbondale, Pa.
Hendrick Mfg. Co., Carbondale, Pa.

PLASTER MACHINERY

Butterworth & Lowe, Grand Rapids, Mich.

PORTABLE CONVEYORS

Link-Belt Co., Chicago, Ill.

POWDER

Hercules Powder Co., Wilmington, Del.

POWER TRANSMITTING MACHINERY

Link-Belt Co., Chicago, Ill.

Webster Mfg. Co., Chicago, Ill.

PUMPS

Allis - Chalmers Mfg. Co., Milwaukee, Wis.

American Manganese Steel Co., Chicago Heights, Ill.

Emerson Pump and Valve Co., Alexandria, Va.

Kansas City Hay Press and Tractor Co., Kansas City, Mo.

Morris Machine Works, Baldwinsville, N. Y.

Swintek Suction Screen Co., Eddyville, Iowa.

Traylor Eng. & Mfg. Co., Allentown, Pa.

PULLEYS

Link-Belt Co., Chicago, Ill.

Weller Mfg. Co., Chicago, Ill.

PULVERIZED FUEL EQUIPMENT

Raymond Bros. Impact Pulv. Co., Chicago, Ill.

QUARRY EQUIPMENT

Universal Road Mach. Co., Kingston, N. Y.

ROAD MACHINERY

Austin-Western Road Mach. Co., Chicago, Ill.

ROPE, WIRE

American Steel & Wire Co., Chicago, Ill.
Leschen, A., & Sons Co., St. Louis, Mo.

SAND SETTLING TANKS

Good Roads Machinery Co., Kennett Square, Pa.

SCALES

Richardson Scale Co., Passaic, N. J.

SCRAPERS, DRAG

Link-Belt Co., Chicago, Ill.

Sauerman Bros., Chicago, Ill.

SCREENS

Austin Mfg. Co., Chicago, Ill.

Austin-Western Road Mach. Co., Chicago, Ill.

Cross Eng. Co., Carbondale, Pa.

Hendrick Mfg. Co., Carbondale, Pa.

Link-Belt Co., Chicago, Ill.

Orville Simpson Co., The, Cincinnati, Ohio.

Smith Eng. Works, Milwaukee, Wis.

Sturtevant Mill Co., Boston, Mass.

Swintek Suction Screen Co., Eddyville, Iowa.

Traylor Eng. & Mfg. Co., Allentown, Pa.

Twin City Iron & Wire Co., St. Paul, Minn.

Tyler Co., The, W. S., Cleveland, Ohio.

Universal Road Mach. Co., Kingston, N. Y.
Webster Mfg. Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

SEPARATORS

Raymond Bros. Impact Pulv. Co., Chicago, Ill.

Sturtevant Mill Co., Boston, Mass.
Tyler Co., The W. S., Cleveland, Ohio.

SEPARATORS, MAGNETIC

Buchanan Co., C. G., Inc., New York, N. Y.

SHEAVES

Link-Belt Co., Chicago, Ill.
Weller Mfg. Co., Chicago, Ill.

SHOVELS—Steam, Electric and Gas

Brown Hoisting Machinery Co., Cleveland, Ohio.

Erie Steam Shovel Co., Erie, Pa.

Hoar Shovel Co., Duluth, Minn.

Orton & Steinbrenner Co., Chicago, Ill.
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The Shovel Co., Lorain, Ohio.

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Weller Mfg. Co., Chicago, Ill.

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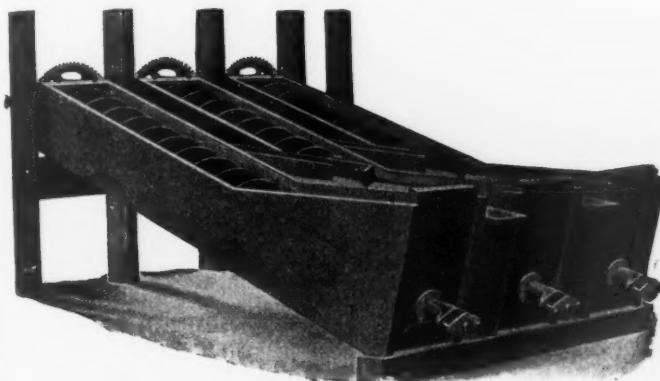
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Mr. Sand Man!

IF it's clean sand you want to produce and you are unable to do so, write to us and state your trouble and we can help you to solve your problem. We make machinery that produces the cleanest Glass Sand.



The Lewistown Equipment, which includes Crushing, Grinding, Screening, Washing, Drying and Conveying Machinery, will produce more and a better quality of Glass Sand, at a bigger profit than any other equipment on the market.

**LEWISTOWN FOUNDRY
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Lewistown, Pa.

WELLER-MADE EQUIPMENT

For Handling the Materials
Mechanically

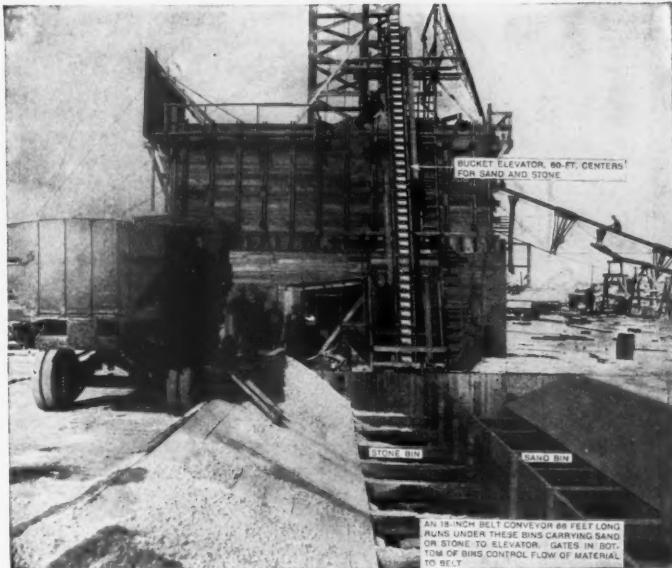
Increase the Output and Reduce
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Machinery to Do the Work

It is sturdy and reliable. Never lays down on the job. The cost of operation is small. Will help pay dividends.

We Make
Conveyors of All Types
Bucket Elevators Portable Elevators
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Screens Sheet Metalwork, etc.



Write and let us know the kind of equipment you are interested in or the material you want to handle. Catalogues showing installations, also data to help in selection of equipment, will be sent.



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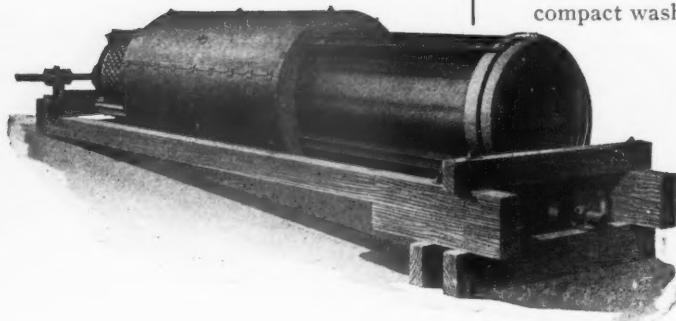
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TELSMITH WASHING SCREENS

Don't take a chance on the quality of your gravel! Wash it! And, while you're about it, don't just wet it; but SCRUB it thoroughly. The first section of the Telsmith Washing Screen is a **scrubber**, equipped with lifting angles and retarding blades that churn up, lift and cascade the aggregate. At the same time, a 2-inch spray pipe plays upon the material and disintegrates the extraneous matter. Dirt can't resist this treatment long. It's soon washed out.

The Telsmith Heavy Duty Washing Screen is the most compact washing screen on the market. It discharges all its product at a point just a few inches lower than its feed. Frequently it saves its own price in the cost of your bins and conveyors. It is simple to drive, reliable in operation, economical of water and upkeep—just the equipment for the modern gravel pit. Glad to send you, without obligation, our bulletin No. GP-11.



**SMITH ENGINEERING
WORKS**
3188 Locust St. Milwaukee, Wis.



SWINTEK'S *Traveling Suction Screen Nozzle*—

Passing the glad tidings along to business friends has become a habit with sand and gravel producers who are using a Swintek Traveling Suction Screen Nozzle.

We have yet to hear of a producer who is not thoroughly satisfied with the results obtained by the use of this Nozzle, and in nearly every instance they are not only willing but anxious to tell the world how well satisfied they are.

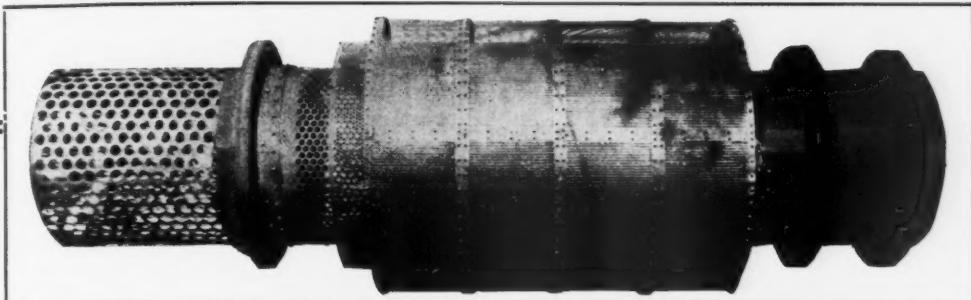
"Yours of the 9th. We are using a Swintek Traveling Suction Screen Nozzle and find it very satisfactory. I have recommended the purchase of this machine to several and feel that I have been the means of selling some of them."

"There is no question but what it will increase the output and prevent choking."

L. R. Witty, General Manager.

Yours truly,
Wabash Sand & Gravel Company.

The Swintek Traveling Suction Screen Co., Eddyville, Iowa, U. S. A.



Revolving Screens

We Manufacture
Bin Gates
Automatic Feeders
All Types of Screens
Transmission Machinery
Complete Belt Conveyors
Complete Bucket Elevators
Automatic Sand Settling Tanks

Our single, double and triple jacketed revolving screens are probably the most outstanding examples of units which have been developed, detail by detail, in actual practice and application at our various plants during two decades.

These screens are made with or without scrubbers, as desired. The scrubbers are attached to, and are part of the screen at the feed end. They are simple in design, very efficient, and require almost no upkeep.

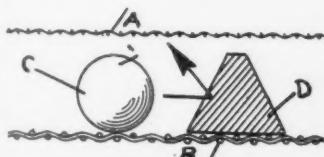
This type of screen is and has been used throughout all the plants of the Greenville Gravel Co. for twenty years, and we strongly recommend this unit to you for capacity, long life, low maintenance and efficiency.

Write for Our Catalogs

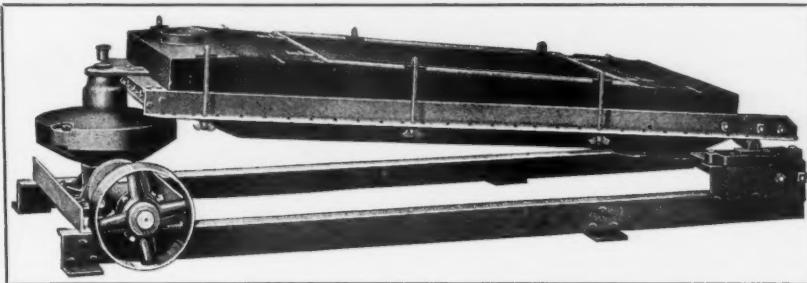
The Greenville Mfg. Co.

"Specialists in Sand and Gravel Plant Equipment"
GREENVILLE, OHIO

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A—Sifting cloth or fabric.
B—Coarser, ball supporting screen.
C—The ball flying about under the rotating action of the screen hits the inclined surface D and is deflected upward, hitting the sifting fabric.



Insures Continuous Uniform Separation—

The basic feature of the Rotex is a series of suitably arranged inclined surfaces for causing many solid rubber balls to be thrown upward against the under side of the nearly level gyrating sieve fabric. This action of

the balls prevents the gradual closing up of the sieves, and insures a continuous uniform separation regardless of material. Write for catalog.

Our thirty-day trial offer should interest every producer whose products must be screened through meshes between two and three hundred per lineal inch

THE ORVILLE SIMPSON COMPANY

1256 Knowlton Street

Cincinnati, Ohio



REPAIRS PRACTICALLY NIL

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"We installed a No. 18 American Pulverizer, July, 1914, at the plant of our subsidiary, the Peerless White Lime Company, St. Genevieve, Mo. We used the Pulverizer for grinding lime for several years but are now using it solely in reducing Rock Spalls from 4" down to 1" and under. The machine has given us entire satisfaction and its use has confirmed the claims of the manufacturers. Repairs are practically nil, and cost of operation is comparatively small. When we require additional machines for our purposes they will be purchased from the American Pulverizer Company of this city. All our transactions with the company have been handled in a business-like and satisfactory manner."

Yours truly,

Gordon Willis, President,
Hunkins-Willis Lime & Cement Company

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MUNSON Under Runner Buhr Mills

There is practically no limit to the degree of fineness to which these mills will grind these products. They will do the work economically and satisfactorily in every way. Solid in construction—will do away with delays and shut-down and keep out of the repair shop. Their Automatic Adjustment, Rapid Grinding and Perfect Balance insure good results and fine and uniform grinding.

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**MUNSON
Mill Machy. Co., Inc.
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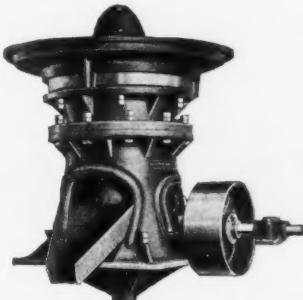
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Austin equipment in your crushing plant will solve your most difficult production problems. Austin Crushers have features found in no others, while Austin Elevators, Screens, Cars and other accessories are in a class with the crushers.

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Crusher Catalog 29-T tells the whole story. Drop us a card and we'll send you one by return mail.



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Austin Motor Rollers

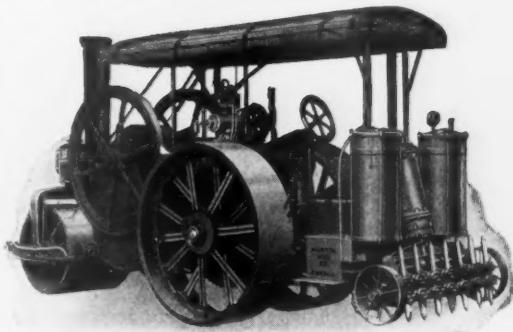
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Three-wheeled rollers in two styles (single or twin engines) and five sizes (7, 8, 10, 12 and 15 ton)—there is a style and size exactly suited to your individual requirements. Pneumatic scarifier can be attached to the 10-ton and larger sizes, as shown in the photographs.

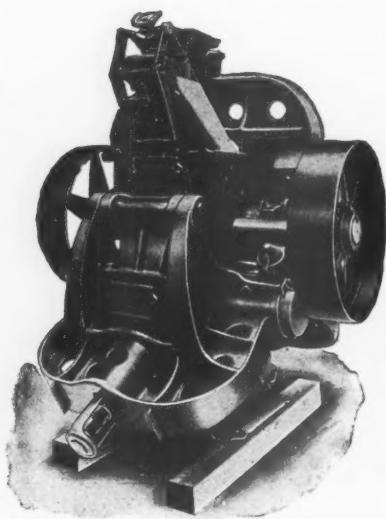
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"Everything from a Drag Scraper to a Road Roller"



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Preliminary Grinder for Tube Mills

LIMESTONE 20 to 40 Mesh
CEMENT CLINKER 20 to 60 Mesh

MAXECON MILL PERFECTECON SEPARATOR

The UNIT that has LARGER OUTPUT with LESS POWER WEAR and ATTENTION than any other.

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Drop us a line

We will be glad to tell you about it

Kent Mill Company
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“A WILLING WORKER”

It is sometimes difficult to get the first olive out of the bottle, but after you get the first one the rest comes easy.

It's the same in selling Type "J" Locomotive Cranes. Sell one Type "J" and repeat orders follow.

WHY?

Because it is a regular "honest to goodness" crane, big by comparison, both in size and service.

It is human nature to like a willing worker, one that does a full day's work, day after day, without interruption or without coaxing.

Try out the type "J" and its operation will speak more convincingly than anything that can be said of its merits.

The McMyler Interstate Company
Cleveland, Ohio

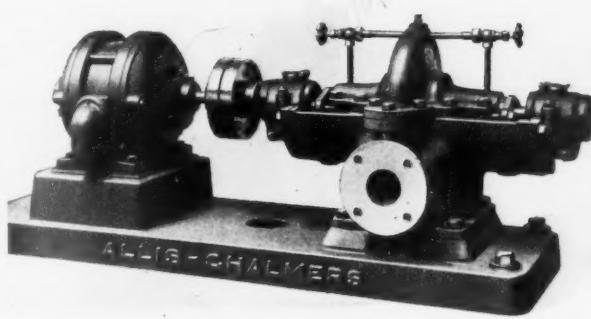
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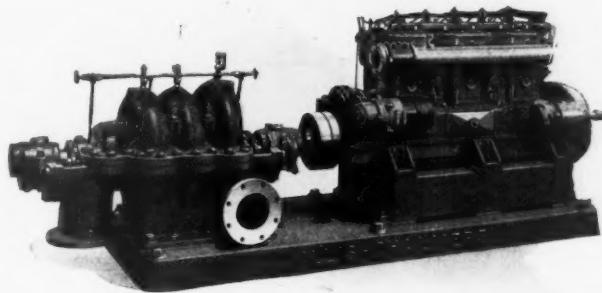
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The above pump is the standard type "S" which is the most generally used. It is a high grade pump and so liberally designed that it will stand up under the hardest kind of service. Type "S" pumps are ideal for gravel washing and similar purposes.



The cut shows a gasoline engine driven high pressure pump suitable for stripping and sluicing service when electric power is not available. It is also used as a fire pump when one is required.

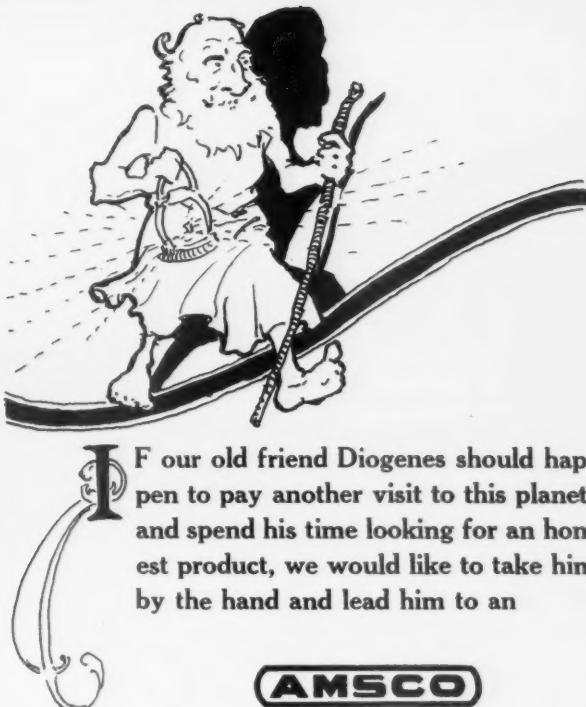
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MILWAUKEE, WISCONSIN. U.S.A.



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AMSCO

There his search would end.

There he would find a product trusted with a reputation requiring years to build, a product constructed with everlasting care from steel analysis through every step of manufacturing until the pump is set up and delivering the promised service.

The Amoco is built to perform herculean tasks and stand up under the strain.

American Manganese Steel Co.

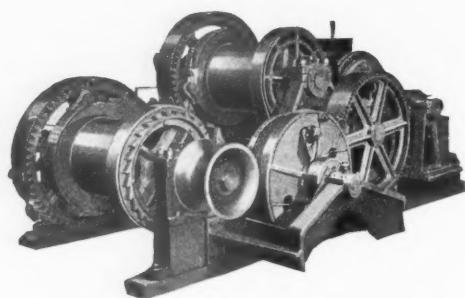
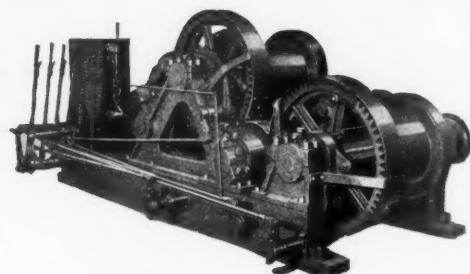
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Single and Two Speed Types



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For
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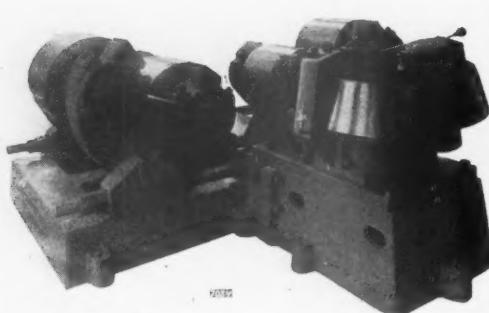


Vulcan Kilns

THE engraving at the left shows an illustration at the Cuban Portland Cement Co. plant, where two Vulcan Kilns, each 9-ft. by 175-ft., are in use, together with two Vulcan Coolers, each 6-ft. by 53-ft.

The kilns which were installed at this plant embody a number of special features, one of which is very plainly seen on this picture, showing that we are prepared to meet the ideas of customers on special equipment. Here special precautions were used to take care of the thrust of the kiln by the use of a special thrust tire and rollers. The usual retaining head was omitted and a cone section was installed in its place. Other special features not shown on this picture were also incorporated.

Inquiries are solicited



VULCAN IRON WORKS

Established 1849

1753 Main Street

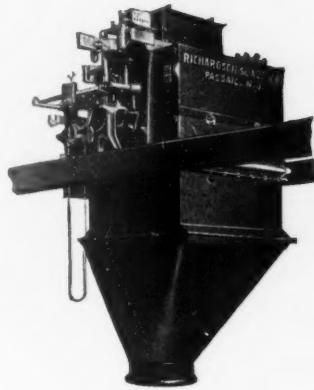
Wilkes-Barre, Pa.

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Improved Accuracy, Convenience and Speed in Weighing and Sacking Pulverized Materials

GYPSUM, PLASTER, MAGNESITE, LIMESTONE,
CEMENT, WEIGHED AND SACKED AUTOMATICALLY

Use a



RICHARDSON AUTOMATIC ENCLOSED DUSTPROOF SACKING SCALE

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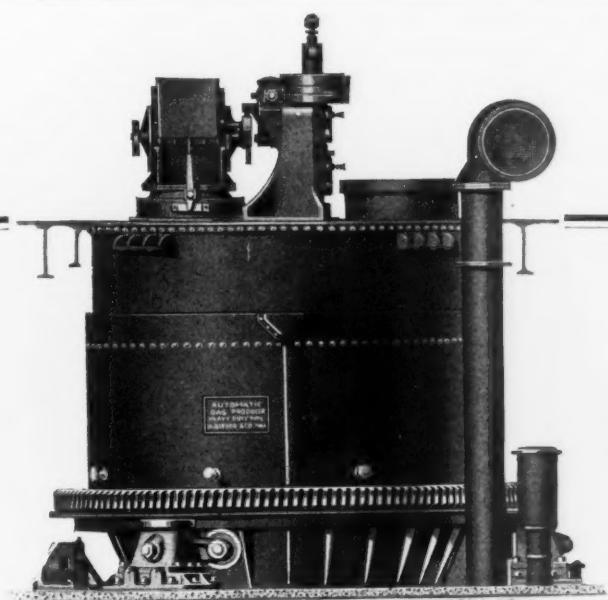
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Wood Automatic Gas Producers



For a maximum of uniformly rich gas from a minimum of fuel, and for low labor cost and small maintenance expense the R. D. Wood & Company's Automatic Gas Producers can not be equaled.

The Heavy Duty type gasifies up to 50 tons of coal per 24 hours and the M. C. type up to 30 tons.

Used in leading lime plants. Our catalog tells why. Send for it.

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VALVES

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ESTABLISHED 1803

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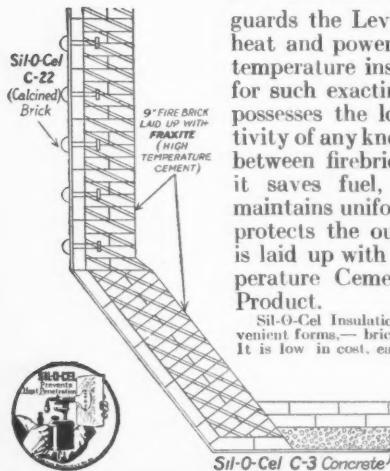


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the pride of the U.S. Merchant Marine will represent the best efforts of American science and engineering. Deep within the heart of this magnificent liner, the steady pulse and throb of motive equipment denotes power,—power generated without loss or waste,—power conserved and utilized to the utmost.

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PREVENTS HEAT PENETRATION
FIRE AND INSULATION INSIDE OUT
A CELITE PRODUCT



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CELITE PRODUCTS COMPANY

Gentlemen: Send Bulletin S-95 and explain in detail the advantages of SIL-O-CEL Insulation, how it saves fuel, increases capacity and maintains even temperatures. I am particularly interested in the insulation of

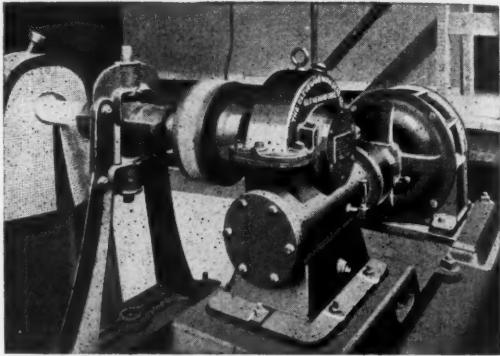
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The modern Worm Drive for speed reducing

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Yet just as important is the low maintenance cost of Cleveland Worm Drives founded on correct tooth shape and pressure, correct materials and manufacture and effective lubrication.

There is a whole lot to the story of success that is making permanent converts to Cleveland Worm Gearing in factory after factory the country over.

May we tell you more about it? Write us today for complete information.

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America's Worm Gear Specialists

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We can tell you about "CARROLL" Quality but you must use the chains to appreciate their real value.

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Last Longer—Are Cheaper in the Long Run
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Guaranteed Performance

rial you are handling, and let our staff make you a guaranteed performance. Then let us work a "Baby" at your plant. If we lower costs and increase production, all that we have guaranteed beforehand, we think you will be glad to hand us your check for the equipment.

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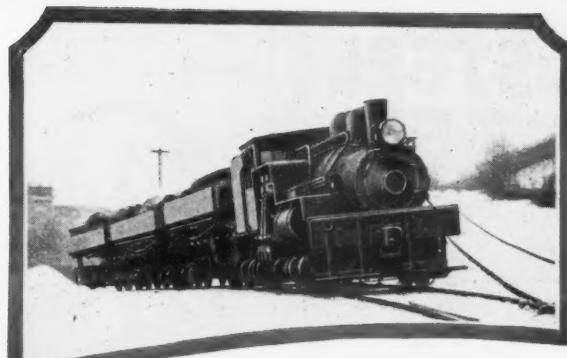
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YOU can do more in a given time with a Shay Geared Locomotive.

On grades, the Shay will outpull a bigger and heavier rod engine and tender.

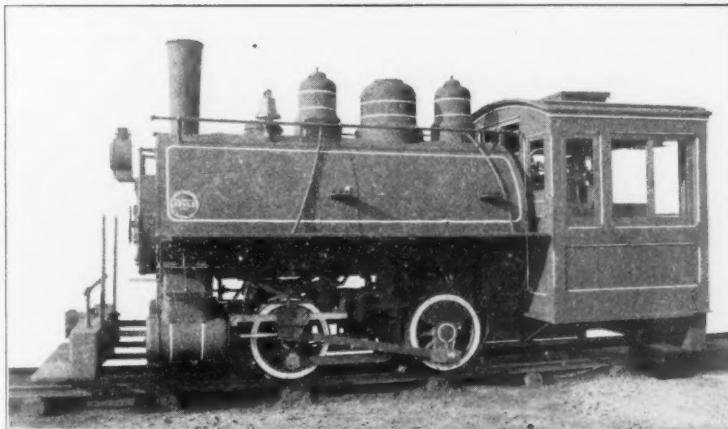
You can work a Shay on track and curves that derail a rod engine.

The Shay has no dead weight in idle engine or tender trucks. Every Shay wheel is a driving wheel.

Rod locomotives have their uses—we build rod engines of all types and sizes—but for quarry and excavating service we recommend the Shay. Would you like to know what a Shay would do on your job?

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Motive Power for Road Builders



Light Design

Gauge, 3' 0"

Cylinders, 10"x16"

Drivers, diameter, 29"

Tank capacity, 700 gals.

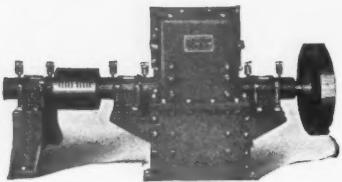
Total weight, 37,000 lbs.

These four-coupled tank locomotives are constructed to withstand rough service, and give excellent satisfaction to Road-building Companies and those who supply Road-building materials.

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"K-B" ALL-STEEL PULVERIZER



**High Production
Low Power Cost**

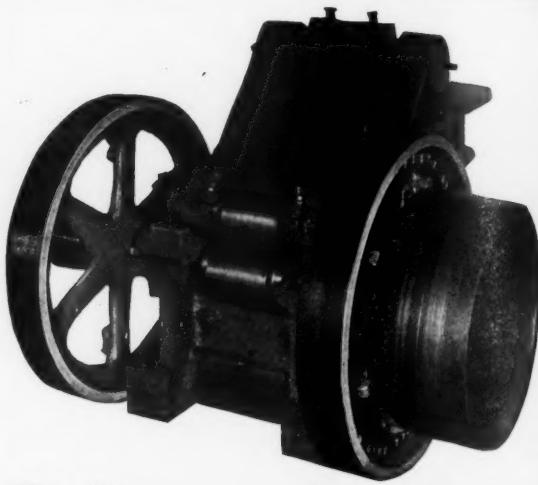
The efficiency of any machine lies in its ability to do a large amount of work with a small consumption of power.

The "K-B" does this!

Ask us for full information



K-B Pulverizer Company, Inc.
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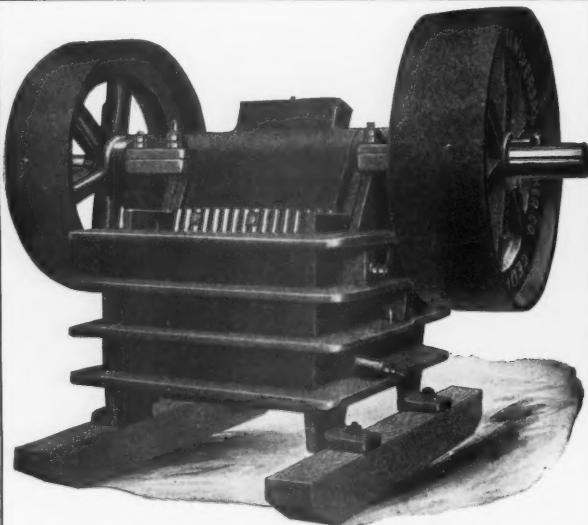
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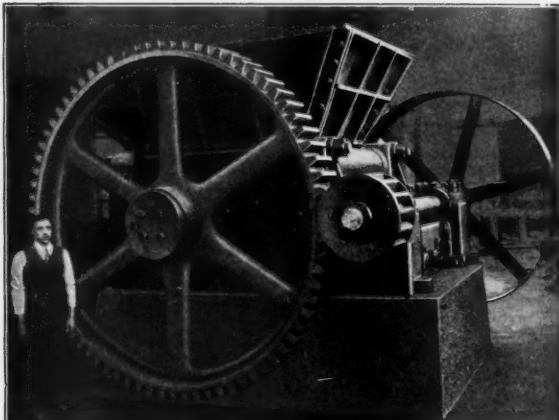
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After many years' practical experience building and operating other crushers, we brought out the first Single Roll Crusher, proved it best, simplest and most economical—making least fines—requires but little head room—no apron or hand feeding—takes wet or slimy material.

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Screens, Elevators, Conveyors, Rock Washers, Etc.

Webb City & Carterville Foundry & Machine Works

Webb City, Missouri

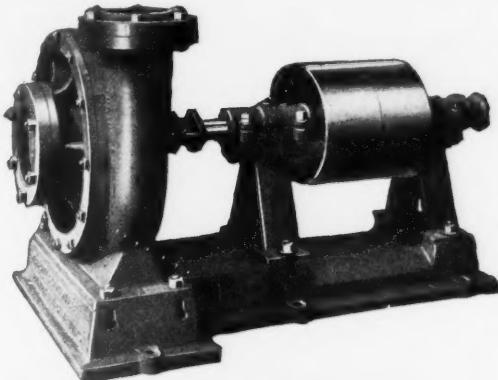
Engineers

Founders

Machinists

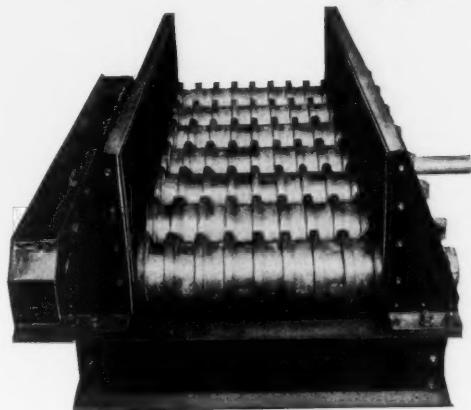
Complete Crushing Plants Designed

Manufacturers of rock crushing machinery: Jaw Crushers, Hercules-Giant and Heavy Duty Crushing Rolls, Screens, Centrifugal Pumps, Elevators, Stone Buckets, Sheet Metal Work, Stone Cars.



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Robins CATARACT Grizzly

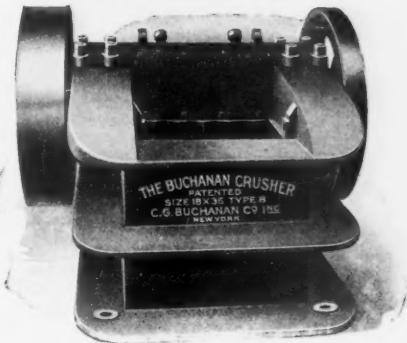


Patents Applied For

Investigate this ruggedly constructed development. It has revolutionized the screening of the coarser sizes of stone, solving the problem of producing a perfectly sized product at a low cost. Let us give you some interesting facts.

ROBINS CONVEYING BELT CO.
New York, Chicago, Birmingham, Boston, Denver, El Paso,
Los Angeles, Philadelphia, Pittsburgh, Salt Lake City,
St. Louis

**Not just
"how is it made?"**



**but
"how best can
I use it?"**

After all, the crusher is only one unit, one step in rock production. No crusher can operate at 100% efficiency unless many other factors are taken into consideration. The selection of any make or size of crusher should be based upon intelligent study—by the crusher manufacturer—of your entire operation. He should be prepared to assist you to secure greater tonnage all along the line—not simply to supply a crusher to handle the rock you may now be breaking down.

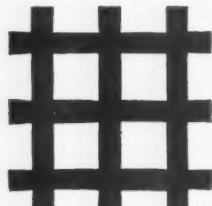
BUCHANAN CRUSHERS

are supplied on this basis. Buchanan Engineers have gone to quarries and doubled their capacity by recommending the correct size of crushers, conveyors and screens, after thorough study of all the elements involved. It costs you nothing to have a Buchanan Engineer visit your plant and render an opinion on your blasting methods, steam shovel operation, crusher arrangement, etc. And, after that, we are prepared to show you the advantage of Buchanan Crusher Construction. Write or wire us.

C. G. Buchanan Company, Inc.
Cedar and West Streets, New York City

**Not simply to sell Rock Crushers
but more efficient
Rock Crushing**

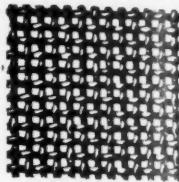
"CLEVELAND" DOUBLE CRIMPED WIRE CLOTH



2 1/2 mesh; .105 wire

A uniform fineness is assured by the use of "Cleveland" Double Crimped Wire Cloth, making it unequalled for the screening of Sand, Gravel, Crushed Stone and Cement. "Service" is the definite policy of this organization, and through every phase of manufacture this end is constantly before us.

A large stock always on hand. However, any special mesh will be manufactured to suit requirements. PRICES RIGHT



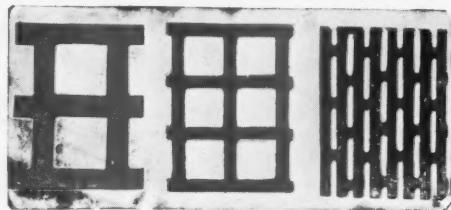
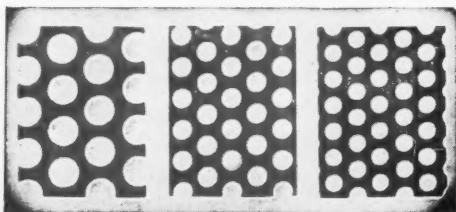
18 Mesh; .047 Wire

THE CLEVELAND WIRE CLOTH AND MANUFACTURING COMPANY

3573 East 78th Street

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For Screening Stone, Gravel, Sand and Cement

All sizes and shapes of holes in metal of proper thicknesses to give the best screening results.

Sheets furnished flat or rolled to shape for revolving screens.

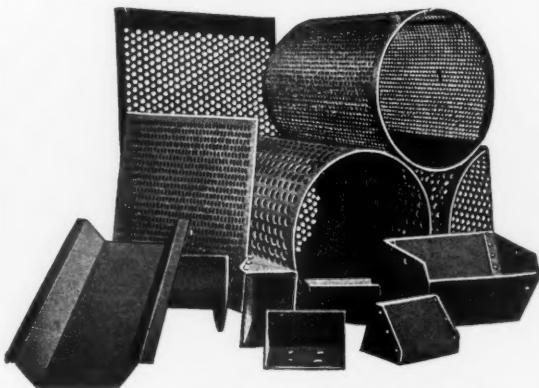
THE HARRINGTON & KING PERFORATING CO.

621 N. Union Ave., Chicago, Ill.
NEW YORK OFFICE: 114 Liberty St.

Perforated Metal Screens

FOR

Stone, Gravel, Sand, Etc.



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General Sheet and Light Structural Work

"Light and Heavy Steel Plate Construction"

HENDRICK MFG. CO.

CARBONDALE, PA.

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The success of any house supplying repair and renewal parts depends on furnishing what is needed quickly and correctly, and of satisfactory quality.

Sixteen years in the Perforated Metal field have given us the experience, equipment and technical knowledge and three hundred tons or more of Steel Plates and Sheets enable us to fill rush orders promptly.

Try us with your next order.

Cross Engineering Company, Offices and Works, Carbondale, Pa.

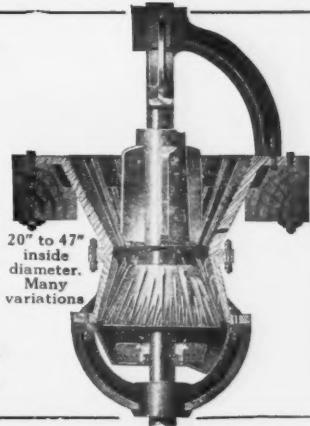


Nippers—17x19", 18x26", 20x30", 24x36" and 26x42"

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For All Rocks and Ores
Softer Than Granite

GYPSUM MACHINERY—We design modern Plaster Mills and make all necessary Machinery, including Kettles, Nippers, Crackers, Buhrs, Screens, Elevators, Shafting, etc.



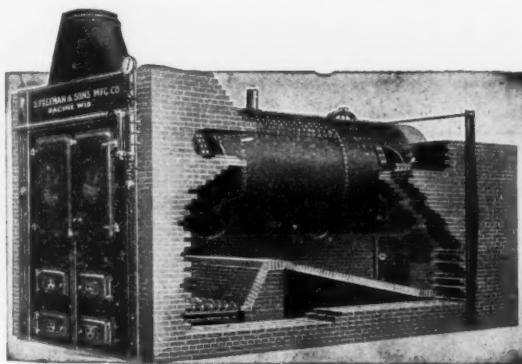
20" to 47"
inside
diameter.
Many
variations

Special Crusher-Grinders for Lime

Butterworth & Lowe

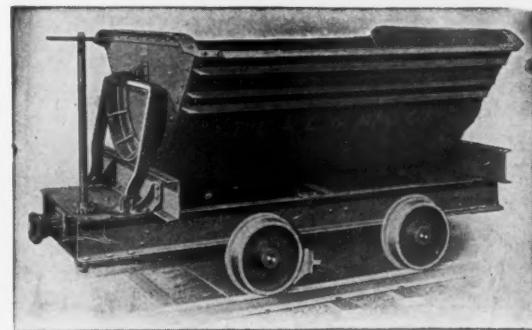
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FREEMAN Horizontal Return Tube High Pressure Boiler



Write for descriptive illustrated catalogue

Freeman Manufacturing Co.
Main Office and Works, Racine, Wisconsin, U. S. A.

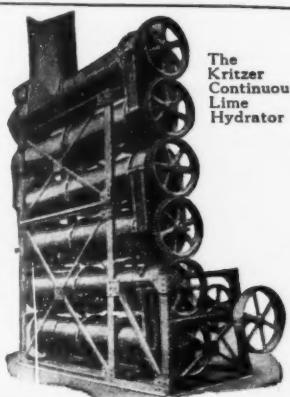


More Than Reinforced

Reinforcing a dump car makes it stronger, of course. But there is a best way to reinforce. Atlas cars are reinforced the best way. Why? Simply because we have built dump cars so long and for so many people that we know just where the reinforcing should go and just how it should be done.

Not much wonder, then, that Atlas dump cars stand the "gaff" better than the average.

The Atlas Car & Manufacturing Co.
ENGINEERS MANUFACTURERS
CLEVELAND, OHIO, U. S. A.



The
Kritzer
Continuous
Lime
Hydrator

HYDRATE

Years ago we helped our customers create a demand for their hydrate. Today the demand exceeds the supply. That's why every lime manufacturer should have an efficient, economical hydrating plant.

THE KRITZER Continuous Lime Hydrator is efficient in production and economical in operation and maintenance. Let us investigate exhaustively the local conditions peculiar to your proposition, and then apply our experience of many years and design a plant to meet those conditions.

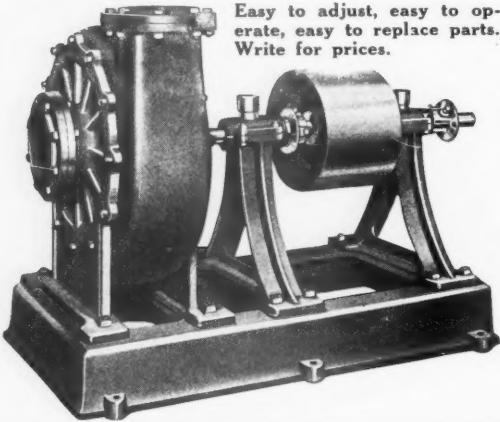
A KRITZER plant, scientifically adapted to your conditions, will give you the best product at lowest cost

THE KRITZER COMPANY
503 South Jefferson Street

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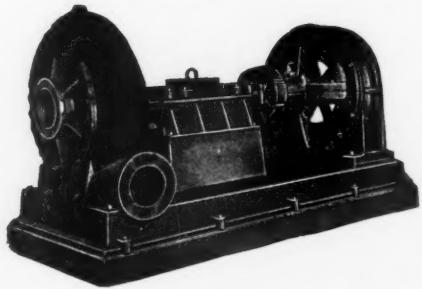
The LIGHTNING Sand Pump

Men who have used the Lightning Sand Pump could not be satisfied with anything less. They have become accustomed to service, and they know the pleasure of uninterrupted production day after day, all through the season.



Easy to adjust, easy to operate, easy to replace parts.
Write for prices.

Kansas City Hay Press & Tractor Co.
Kansas City, Mo.



Heavy Service Dredging Pump

Where conditions are too severe for our standard sand pump, the above type is recommended.

It is built in sizes from 4 in. up, arranged for belt, motor, or engine drive.

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Bulletin No. 19-B fully describes our complete line of sand and dredging pumps. Have you your copy?

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Since the Civil War Builders of Centrifugal Pumps, Hydraulic Dredges, and Steam Engines

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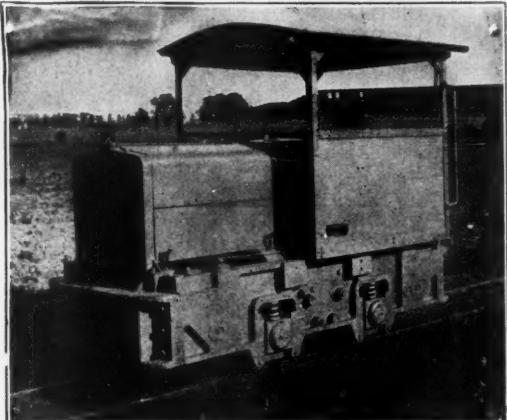
for Stucco

Metro-Nite White is a siliceous dolomite, extremely hard, sharp, cleanly graded and makes a bright, sparkling face for stucco buildings, concrete bricks or blocks.

It is generally accepted as the most beautiful and artistic facing known for this purpose, and we will gladly send samples to anyone who is interested in carload lots.

Metro-Nite can be delivered either in white or green.

THE METRO-NITE CO.
333 Hartford Ave., Milwaukee, Wis.



QUARRIES—CEMENT PLANTS— BRICK PLANTS

The success of Whitcomb locomotives in hundreds of plants speaks of their thoroughness of design and construction and dependability in time of need. We would be glad to tell you what they are doing for others.

Whitcomb locomotives are designed to work and built to overwork

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GEO. D. WHITCOMB COMPANY

Rochelle, Ill., U. S. A.



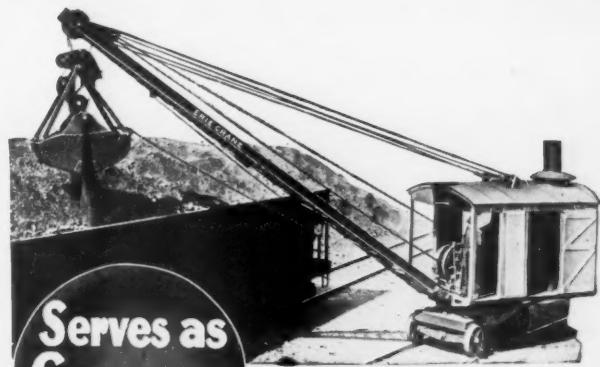
Steam, gasoline, or electrically operated Locomotive Cranes for bucket, dipper or dragline operation; yard service and construction work; with capacities ranging from 5 tons to 60 tons; booms to suit, varying from 40 ft. to 140 ft. in length.

"INDUSTRIAL" Locomotive Cranes are built so as to be readily convertible for various operations. The same Crane may be used for pile driving, automatic grab bucket operation, drag-line operation and for handling heavy loads with hook and block. Booms may be built in sections so that the length may be quickly changed to meet various conditions. The propelling mechanism is of a powerful, sturdy type that makes the Crane efficient in switching and hauling heavily loaded cars.

Your requirements, when submitted to Industrial Works engineers, will receive the benefit of fifty years' experience in the designing and building of material handling equipment.

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INDUSTRIAL WORKS, Bay City, Mich.



**Serves as
Crane or
SteamShovel**

Every ERIE can be quickly and easily changed over to a Locomotive Crane. Gives excellent service with clamshell bucket — excavates gravel, loads cars, handles storage, etc.

The Standard Builders' Supply Co., Grand Rapids, Mich., own 2 ERIES—a Steam Shovel and a Crane. They write:

"Our first ERIE has been digging hard gravel for 3 years without any repairs. We have in the past operated other steam shovels that are good, but the ERIE is the best, being by far the most substantial!"—



Serves both as
Crane and Steam
Shovel

WE WILL BE GLAD TO SEND YOU A BULLETIN SHOWING JUST WHAT YOU CAN DO WITH THE ERIE, BOTH AS CRANE AND STEAM SHOVEL. WRITE FOR BULLETIN P-16.

BALL ENGINE CO. Erie, Pa., U. S. A.

Builders of ERIE Steam Shovels and Locomotive Cranes

**ERIE Revolving
Shovels**



**Greater crowding power
for quarry service—**

—it's assured by the Northwest Shovel's one-motor construction.

The Northwest has only one motor—gas or electric. There are no gears, sprockets, racks or auxiliary engines; full hoisting power is applied for crowding by an ingenious rig of cables that gives 25 per cent greater power at the dipper lip.

How this greater power is combined with the mobility of the famous Northwest Cranes and Draglines is an interesting story. Write—

Northwest Engineering Co. Chicago, Ill.

NORTHWEST

SHOVEL

**CRANE
DRAGLINE
SHOVEL**



**OSGOOD STEAM
SHOVELS**

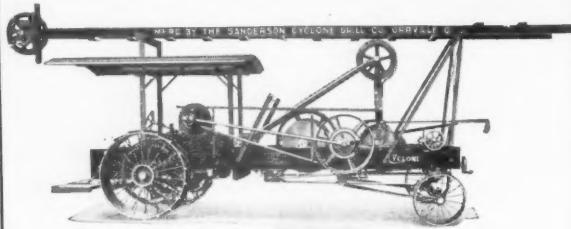
Osgood Railroad Type Steam Shovels on traction wheels offer an easy solution to heavy material handling problems in pit or quarry.

Wide range of capacities, ease and speed of operation, big output with low maintenance cost and long life are a few of the reasons why they can help.

Ask for our catalog

The OSGOOD Company
Marion, Ohio, U. S. A.

The Cyclone No. 14 Junior



A Drill for Plants of Limited Production

FOR a number of years there was a demand for a small and light blast hole drill of the well driller type capable of handling drilling tools of medium weight used for drilling holes from 4 to 5 inches in diameter. Many lime plants, some cement rock and sandstone quarries, pits producing shale for brick manufacture and quarries having shale overburden that requires blasting, have need for such a drill.

To meet this demand, the Cyclone No. 14 Junior drill was placed on the market two years ago. In design it is a counterpart, only built on a smaller scale, of the No. 14 Standard (now called Standard to distinguish it from the Junior), which is now over thirteen years old, having grown up with the big hole method of drilling and blasting. The same care and workmanship are maintained in the Junior. It has cast steel working parts. It is lighter and speedier and may be had at a lower first cost than the No. 14 Standard which, for plants as described in the preceding paragraph, is a little heavy and has a surplus capacity.

The No. 14 Junior and the No. 14 Standard make a complete line of big blast hole drills. They are fully described in our Catalog B-45. Write for a copy.

THE SANDERSON-CYCLONE DRILL CO.
ORRVILLE, OHIO

Eastern and Export Office: 30 Church Street, New York City



Gruendler Hercules Crushers

Gruendler Hercules Crushers are reducing production costs in hundreds of plants throughout the country.

"America's Famous Crushers"

For Crushing and Pulverizing Limestone, Lime, Gypsum, Shale, etc., a Gruendler cannot be beat.

Write for Interesting Bulletin

Gruendler Patent Crusher & Pulverizer Company
908 North Main Street St. Louis, Mo.

New Holland Rock Crushers

for primary or secondary use for road and concrete grades.



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Crushers, Elevators, Conveyors,
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New Holland Machine Company
New Holland, Pa.



OUR working arrangements with the foremost lime and hydrating engineer in the country, together with the practical experience and technical qualifications, enables us to make a special investigation of lime deposits, and then treat them properly in order to secure the best results.

We also manufacture:
Dryers
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Gas Producers
Rotary Screens
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Special Machinery from Engineers' Designs

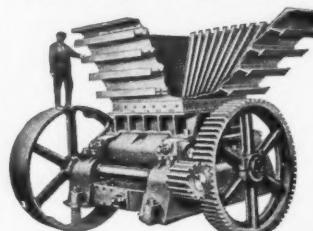
The York Kiln makes possible a high thermal efficiency with a low fuel consumption, cutting the "per ton" cost of calcination to the minimum.

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332 S. Michigan Ave., Chicago

50 Church St., New York

"PENNSYLVANIA" Single Roll Crusher



Put Your Reduction Problems Up to Us

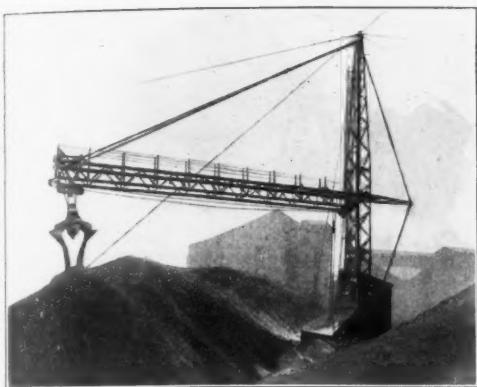
PENNSYLVANIA CRUSHING COMPANY
Stephen Girard Bldg., Philadelphia

New York
Pittsburgh

The New Series of "Pennsylvania" Single Roll Crushers take steam-shovel feed of limestone, cement rock, gypsum and similar materials, — wet and sticky, — without feeder, and make maximum reduction in one operation. All parts readily accessible. Maintenance cost lower per ton than for any other type. Massive construction — Reliable Safety Devices — Convenient adjustment. Capacities 5 to 450 tons hourly.



Chicago Office: Railway Exchange Bldg. New York: 30 Church St.



This crane cut the costs and boosted the efficiency of a large cement plant

The "AMERICAN" Steel Storage Crane, shown above, solved a difficult storage problem for the Pacific Portland Cement Co., in storing, aging and reclaiming burned limestone. It will do as much for you no matter what kind of material you wish to handle; clinker, crushed rock, concrete aggregates, tile, brick, etc. It adapts itself to all materials and insures orderly and economical handling and storage.



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Morse Chain Drives

A POWER SAVER FOR POWER USERS

Morse Chain Co., Ithaca, N. Y.

HIGH SPEED SILENT RUNNING FLEXIBLE GEARING
FOR POWER TRANSMISSION

Address Nearest Office

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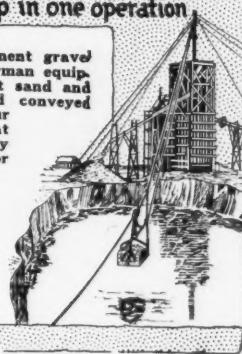
SAUERMAN DRAGLINE CABLEWAY EXCAVATORS dig, convey, elevate and dump in one operation.

Cost data furnished by prominent gravel producers who are using Sauerman equipment backs up our claim that sand and gravel can be excavated and conveyed from pit to plant by one of our drag-line cableway excavators at a lower cost per ton than by using any other equipment or combination of equipment.

Write for Catalog No. 7

Sauerman Bros.
1140 Monadnock Bldg.
Chicago

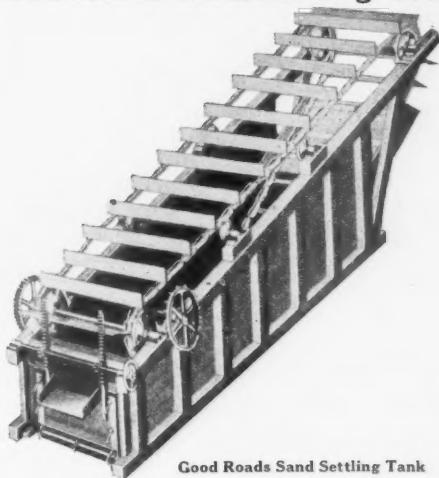
Also Mfrs. of Power Scrapers



The Sand That's In Demand

is clean sand—the kind that's washed—the kind that's produced with a

Good Roads Sand Settling Tank



Good Roads Sand Settling Tank

Our business is to design and build complete sand and gravel washing and screening plants—the kind that give satisfaction and profit to the user.

If you expect to change or enlarge your present plant, or equip a new plant, we would like to confer with you. Our advice will cost you nothing.

Ask for catalogue No. 5A. It is an informing book for sand and gravel producers

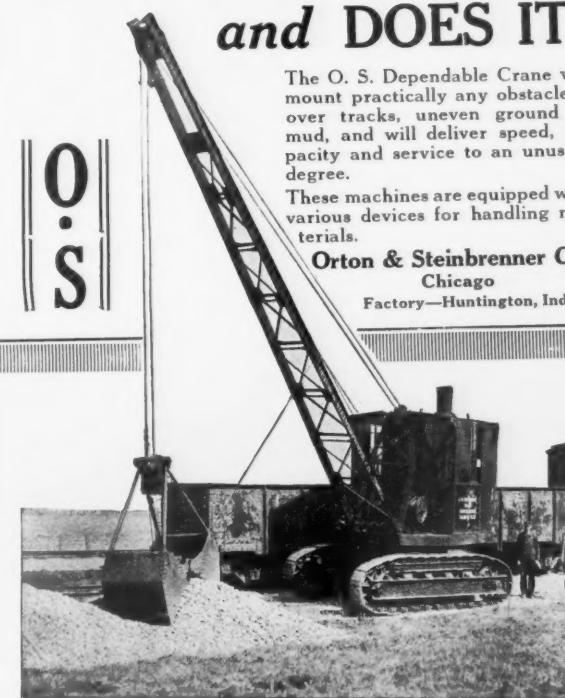
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Built to go anywhere— and DOES IT!

The O. S. Dependable Crane will mount practically any obstacle—over tracks, uneven ground or mud, and will deliver speed, capacity and service to an unusual degree.

These machines are equipped with various devices for handling materials.

Orton & Steinbrenner Co.
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Factory—Huntington, Ind.



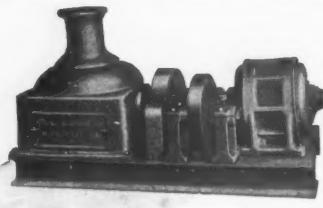
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Insure Fullest Satisfaction

Crushing Rolls.
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Direct and Indirect Fired Dryers.
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Sprockets, Traction Wheels, and Roll Heads.
All kinds of High Grade Chilled Charcoal Iron Castings
for All Uses.

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The "HANDY MAN" Car Puller

This car puller equipment will give you absolute control in the spotting or re-
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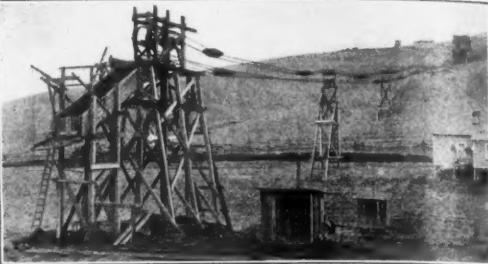
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The Morgan Producer Gas Machine

is the highest class gas producer built in the U. S. and is advertised in this journal the second issue of each month.

Morgan Construction Company
Worcester, Mass.

W. D. Mount, 601 Peoples National Bank Bldg., Lynchburg, Va.,
Representative in the Lime Industry



LET GRAVITY DO IT

Turn the obstacle into an asset by using an
AUTOMATIC AERIAL TRAMWAY

Write Us

Interstate Equipment Corporation - 25 Church St., New York City

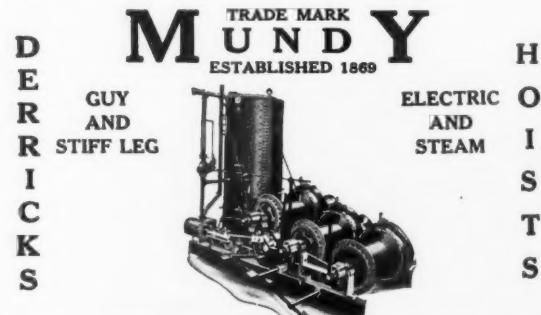
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EMERSON FOOT VALVES AND STRAINERS

For Contractors, Mines, Quarries, Cofferdams
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Immediate Deliveries

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For Mortar, Cement and Brick—
Brown, Black, Red and Buff
—Strongest and Most Durable

Manufactured by

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Correspondence Solicited EASTON, PA., U. S. A.

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CHICAGO, ILL.

Design and build cement plants, rock crushing plants, power plants and industrial structures.

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The Byers "TruckkranE" can be driven to work just like any automobile. Saves time and expense on every job. One owner recently refused \$50.00 rental per day for a two weeks job in Chicago. Ask for "TruckkranE" Bulletin.

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Builders of Full Circle Cranes, "Auto-Cranes," Buckets, Hoists, etc.

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WE MAKE CARS FOR
COAL, ORE, STONE, SAND, GRAVEL,
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CARS. THE WATT FACTORY IS THE LARGEST IN
THE WORLD DEVOTED ALONE TO CAR BUILDING
OVER 50 YEARS' EXPERIENCE
CATALOGS

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Inspection New and Second Hand Machinery, Pumps, Crushers, Steam Shovels, Cars, Locomotives, Rails and Quarry and Contractors' Equipment

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Cement, Chemical and Physical Testing Laboratories

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Quality and Service Always—

We manufacture screens in any desired wire material, in any style, or size of mesh. Uniform Double Crimped sand and gravel screens. Heavy screens for crushed stone. A large stock of galvanized wire cloth and fine mesh in either steel, copper or brass always on hand. "Everwearing" spring steel screens are practically indestructible.

Send for circular—prices always right

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By using Diamond Core Drills. We drill for Lime-stone, Gypsum, Talc, Fire Clay, Coal and all minerals.

We are fully equipped for testing foundations for bridges, dams, buildings, and all work of a similar character.

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Drilling Contractors
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Rates for advertising in the Used Equipment Department: \$2.50 per column inch per insertion. Minimum charge, \$2.50. Please send check with your order. These ads must be paid for in advance of insertion.

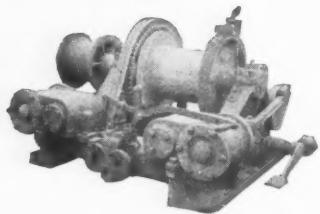
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Emerson, Bratingham Hoists

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DOUBLE CYLINDER, SINGLE DRUM, IN FIRST CONDITION

\$125.00 Each F.O.B. Chicago



Capacity 10,000 Pounds

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Detailed Specifications Furnished on Application

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—to help you sell what you no longer need

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 You'll find plenty of new ones, short cuts and time savers in ROCK PRODUCTS.

Our traveling editors are running around, dropping in here and there finding out just how things are done, and then they tell you how the other fellow makes things hum.

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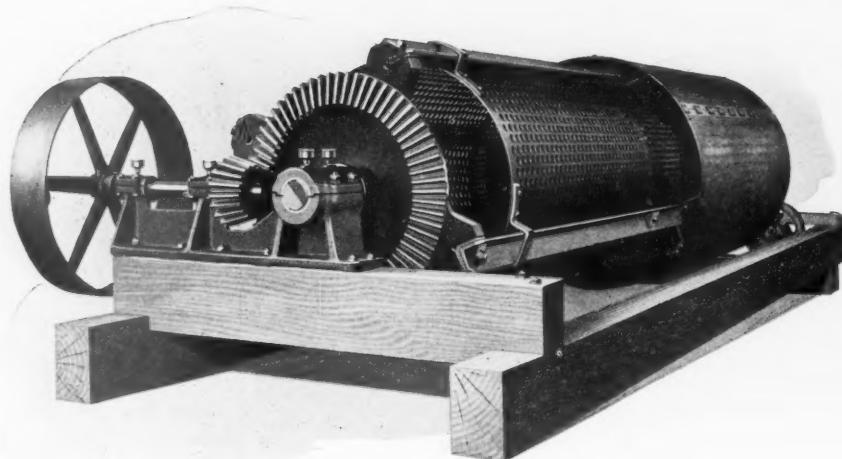
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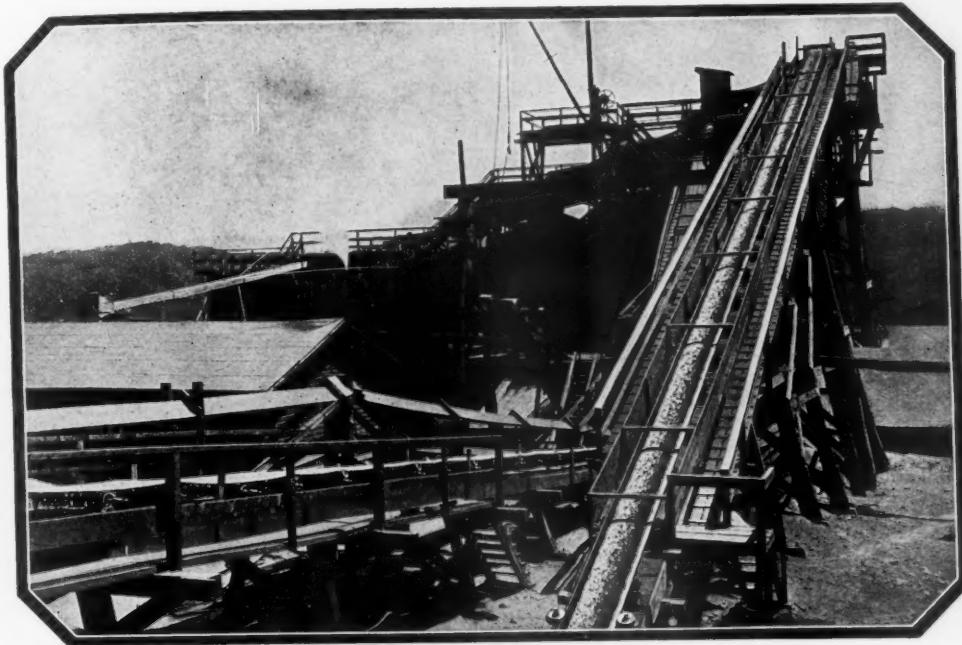
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The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Entered as second-class matter, July 2, 1907, at the Chicago, Illinois, Postoffice, under the Act of March 3, 1879.

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A Far-Reaching Influence

M R. H. A. RYAN, manager and director for the Buxton Lime Firms Co., Ltd., Royal Exchange, Buxton, England, writes us as follows:

"We understand you have, in connection with your paper, ROCK PRODUCTS, a service system which is at the disposal of your readers.

"As we are continually in the market for equipment, we should be glad to make use of this service, if we may be permitted to do so.

"We would like to have names of manufacturers, catalogs and data with respect to steam locomotives, particularly the geared type, and of petrol or paraffin internal combustion locomotives.

"It is quite possible that in the near future we may consider the manufacture of sand-lime brick and if you could arrange for us to have some catalogs and data concerning this particular subject, we should be grateful.

"We note with interest that you are publishing in book form the papers and proceedings of the National Crushed Stone Association convention, held recently in Chicago. We would like to have a copy of this when it is published."

* * *

Mr. Ryan is but one of many who write to Rock PRODUCTS for guidance in the selection of suitable equipment. They have learned to count on Rock PRODUCTS' service to supply their equipment needs as well as to provide them with news, prices, and helpful operating suggestions in its editorial columns.

ROCK PRODUCTS service is complete. It is the one journal in the industry that is looked upon internationally as the reliable source of all information.

The Quarry Manual

ORDERS for extra copies of the Quarry Manual are coming in from all parts of the country. W. Scott Eames, general manager of the New Haven Trap Rock Co., New Haven, Conn., writes as follows:

"Please place my order for 12 copies of the March 10, Quarry Manual issue, of ROCK PRODUCTS.

"I intend to place a copy of this Manual in the hands of all my superintendents, quarry and plant foremen."

H. E. Bair, general manager of the France Stone Co., Toledo, Ohio, orders 25 extra copies. W. W. Boxley, Roanoke, Va., orders seven.

The big men realize that they are helping themselves when they help broaden their subordinates, their superintendents and foremen.

The Quarry Manual marks the beginning of real progress in the quarry industry, for progress comes only through the economy of knowledge. The Manual supplies this want. A volume containing more than 200 pages of text covering the various phases of quarry operation—the contributions of experts to the 1923 convention of National Crushed Stone Association. It marks the beginning of permanent quarry literature—the only handbook of the industry.

Its proved value to such men as Eames, Bair and Boxley is the criterion of its function in the industry. Extra copies will cost \$1 each. Order yours before the supply is exhausted.



*At work in a
quarry*

Putting More Power In Every Operation

THE new $\frac{3}{4}$ yard Northwest Crawler Shovel is simpler than any other shovel you have ever seen, whether gas, electric, or steam. It has greatest mobility, a more powerful crowd and costs less to maintain.

Because Northwest has but a single motor — gas or electric as preferred — it withstands the shocks of day-in, day-out handling of heavy stone in quarries. The full power of the motor is obtained in digging, propelling and swinging.

A simple system of cables replaces the usual complicated system of gears, racks, sprockets, chains, auxiliary driving engines or motors.

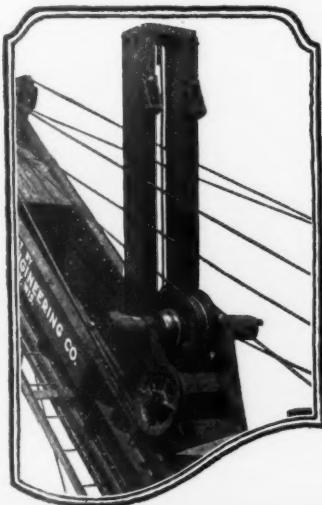
The unique arrangement not only gives the Northwest a more powerful thrust, invaluable in quarry service, but gives it a flexibility of operation that leaves nothing to be desired. It decreases the gasoline consumption and makes maintenance a simple and inexpensive item.

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Northwest Engineering Co., Chicago, Ill.



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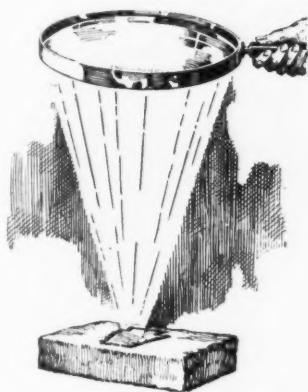
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A section of the Kiln Room, taken from the extreme hot end of the Kilns and showing the first line of bearings

IN KEYSTONE-KEYSO Greases we are offering a formula which is a remarkable step forward in the development of efficient lubrication of machinery operating under high heat conditions. They combine all the necessary heat resisting properties with a high lubricating value and efficiency. Their use under the severest working conditions of heat have not resulted in decomposition or waste, but, on the contrary, the grease has held in bearings where other lubricants have given little or no satisfaction.



Send for Booklet describing Keystone-Keyso High Melting Point Greases.

Keystone-Keyso *High Melting Point Grease*

has been developed after considerable laboratory and practical service research work, and is now in use in many representative American industries giving more economical and efficient service.

Keystone-Keyso Grease is manufactured in six densities, numbers 40 to 45 inclusive. Nos. 40, 41, 42 and 43 are supplied in brick form for use in open well boxes. Nos. 44 and 45 are for use in Keystone Hand Compression and Spring Automatic Grease Cups.

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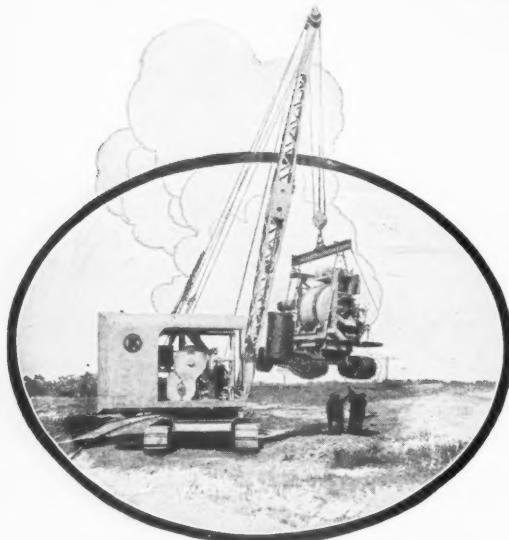
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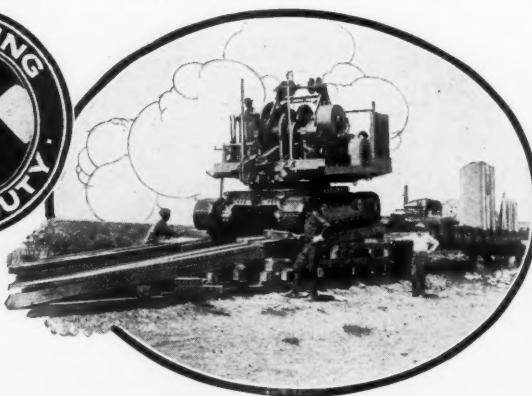
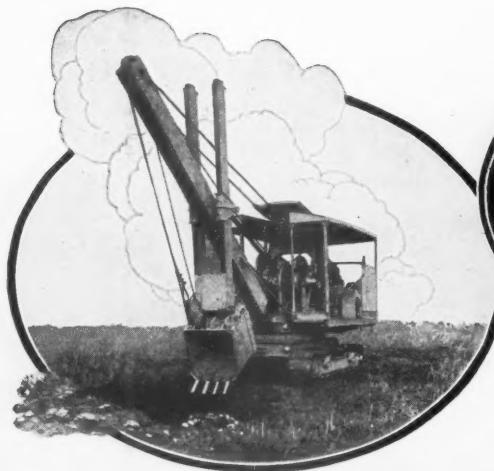
No. 2 Capacity: 12 tons at 12' radius. $\frac{1}{2}$ yard clamshell bucket loaded with sand or gravel at 45° radius. $\frac{3}{4}$ yard clamshell bucket loaded with sand or gravel at 39° radius. 1 yard clamshell bucket loaded with sand or gravel at 33° radius. $\frac{1}{2}$ yard clamshell bucket loaded with sand or gravel at 24° radius. 1 yard Page drag bucket on a 40° boom.

No. 3 Capacity: 20 tons at 12' radius. 1 yard clamshell bucket loaded with sand or gravel at 50° radius. $1\frac{1}{2}$ clamshell bucket loaded with sand or gravel at 39° radius. 2 yard clamshell bucket loaded with sand or gravel at 33° radius. $1\frac{1}{2}$ yard Page drag bucket at 40° radius.

No. 1 Capacity: Equipped with 30° boom. Handles $\frac{3}{4}$ yard bucket at 25° radius; lifting capacity at 12', 14,000 lbs. 4 cylinder 5 $\frac{1}{2}$ x 6 $\frac{1}{2}$ gasoline engine.

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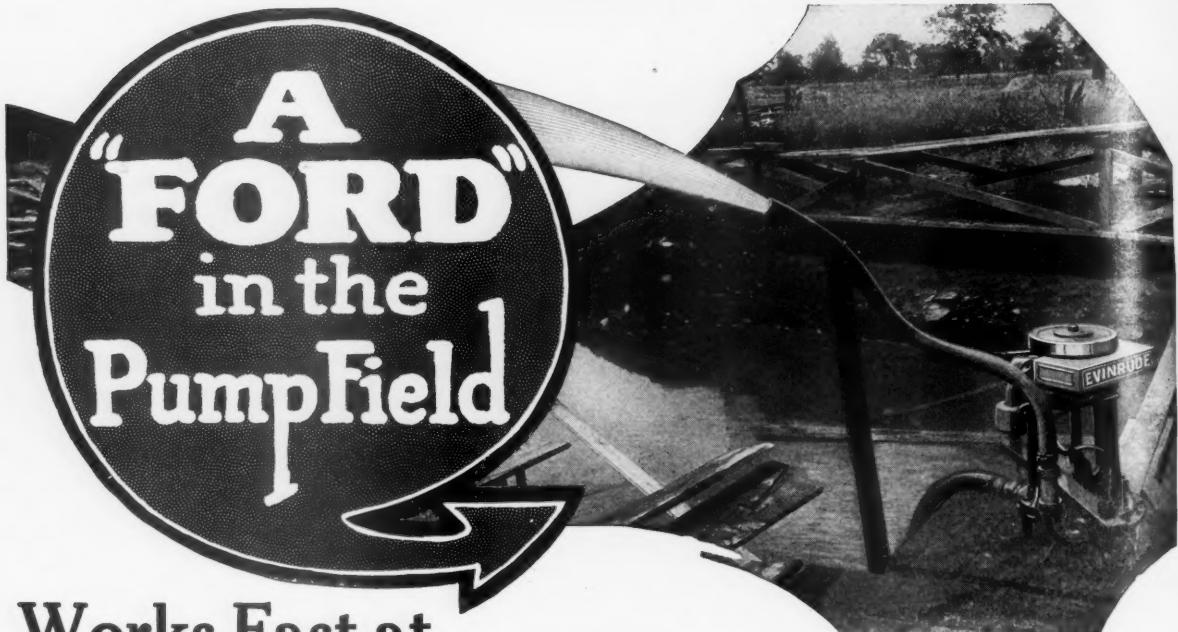
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The many new and distinctive features of design and sturdiness of construction make No. 37 particularly desirable for rock quarries, sand and gravel plants, clay pits, mining and stripping operations, handling slag or ore, and contracting work of every description.

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During these thirty-eight years preference for Marion Products has been continually intensified by the exceptional performance and reliability of Marion Shovels in every day use.

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A group comprising shovels and attachments that are adapted to *all* kinds of work suited to shovels of the revolving type. Working limitations of these Models are not fixed merely to one kind of power or one type of equipment for they can be supplied with steam, gasoline or electric power and in many combinations of dragline, clamshell or orange-peel excavators. Trucks can be arranged to suit nature of work and these can be rigid or flexible "Crawlers," traction or railroad wheels.

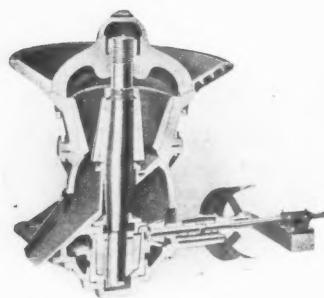
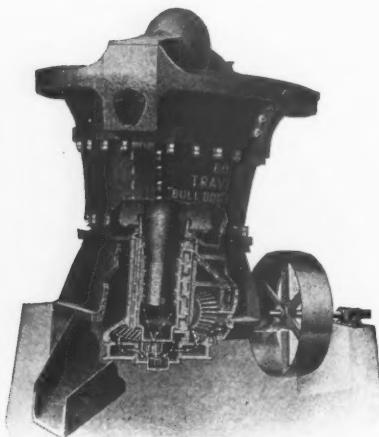
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The Marion Steam Shovel Company Marion Ohio.

Marion Crawler Trucks Make Hard Going Easy

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IN ADDITION, with a Traylor Bulldog, you secure six other exclusive improvements — Hewes' bar-type, non-weaving spider—scientific shaft suspension — non-deflecting, unbreakable shaft — smooth running cut gearing—extra large self-align-

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Its long reach enables it to pick out streaks of clay and pockets of sand from your deposit and cast them out of the way.

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These are but a few of the many advantages of the dragline.

Let us tell you more

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Railroad Type and Revolving Shovels of All Sizes, Dragline Excavators, Trench Excavators, Dipper,
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Repeating Your Product

The PLYMOUTH Locomotive is the most persistent "Repeater" of any haulage unit on the market.

The initial sale quite frequently inspires the one—two—three and even four succession.

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